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ABSTRACT

To identify problems regarding economic development, the Committee for Scientific and Technical Personnel conducted an educational and occupational survey of each member country of the Organisation for Economic Cooperation and Development (OECD). The specific purpose of the surveys was to gather comparative data on the training and utilization of technicians in each member country. Major sections of each survey are: (1) The Structure of the Educational System, (2) Training of Technicians and Other Technical Manpower, and (3) Functions of Technicians. Related surveys for each of the following countries, Canada, Denmark, Spain, Netherlands, Switzerland, Yugoslavia, United Kingdom, Portugal, and Italy, are available in this issue as VT 015 716-VT 015 718, VT 015 720-VT 015 725 respectively. (JS)

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SCIENTIFIC AND TECHNICAL PERSONNEL

THE EDUCATION, TRAINING AND FUNCTIONS OF TECHNICIANS

FRANCE

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DIRECTORATE FOR SCIENTIFIC AFFAIRS

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

1

SCIENTIFIC AND TECHNICAL PERSONNEL

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THE EDUCATION, TRAINING AND FUNCTIONS OF TECHNICIANS

FRANCE

DIRECTORATE FOR SCIENTIFIC AFFAIRS

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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INTRODUCTION

This report, sponsored by the OECD describes a period of transition. The educational Reform Act of 6th January, 1959 provided for the restructure of the "first cycle" and "orientation"; the second cycle was established by the Decree of 10th June 1965 while the regulations introducing the "brevets de techniciens" were issued during the 1965-66 school year. The definition of future "baccalauréat de techniciens" is still being studied by the competent departments and commissions. Furthermore, a limited number of "University Institutes of Technology", which will train a large proportion of "high technicians" operate on an experimental basis.

Faced with a situation where one educational structure is gradually being replaced by another, the effectiveness of which can be assessed only over the next decade, the authors of the report could merely record the basic transformation which the training of technicians is currently undergoing in France.

However, it is possible to describe the bases on which the Ministry of Education intends to establish this training, after having sounded out the views of the professional and trade associations concerned.

The term "technician" is used in widely different senses, varying from occupation to occupation and even from firm to firm. While the rating of technicians is not the concern of the Ministry of Education, the Ministry does need to have a sufficiently precise idea of the functions for which they are responsible. Such information provides the only criteria on which technician training should be based.

Every firm combines the functions of design development and execution. While the first two are mainly matters for the engineer, execution calls for labour with a varying degree of skill; therefore the move from design to execution is the responsibility of the technician.

Skill in carrying out these tasks presupposes that the technician will have acquired during his formal education a store of theoretical and practical knowledge so that he will need only a reasonably short time to adapt to his job; this assumes, therefore, that his training will be designed to meet industry's real needs.

However, the rapid pace of technical change, the uncertainty in industry itself as to the structure of firms in a few years' time, and the desire to provide future possibilities of promotion are all arguments in favour of this training being as comprehensive as possible.

The crucial point is to strike a balance between the part of the curricula devoted to general education, without which the individual would later be unable to develop his abilities, and the part providing the theoretical and practical knowledge needed to practice a trade. The curricula currently provided for the training of technicians attempt to fulfil this aim. They have been drawn up on a provisional basis for the years 1967 - 1968 and 1969 in order to allow for any changes that may be necessary in the light of experience.

At the level of higher technicians who are trained in two years of study after the baccalauréat or "brevet de technicien", an entirely new form of higher education has to be devised and implemented; the higher technician, who is a direct assistant to the engineer, needs to be specifically trained for this purpose; current schemes covering various sectors of economic activity should make it possible to determine guide-lines for this new form of training.

In these circumstances, while this report describes accurately the present arrangements for the training of technicians in France, it is dealing with a situation which is changing rapidly. In particular, the reader should bear in mind the prospects which have been opened up by the complete overhaul of the educational system since 1959. Improved recruitment, thanks to the raising of the school-leaving age, the introduction of "baccalauréat de techniciens", the possibility of access to higher education for these technicians, and the provision of a balanced education comprising both a general course and technical and practical training should make it possible in the years ahead to meet the need for technicians at various levels. The Ministry of Education hopes that the arrangements adopted will satisfy both this need and the individual's understandable desire for promotion.

PREFACE

The OECD Committee for Scientific and Technical Personnel has shown great interest in the problem of the technician shortage, which it considers a key element in the development of Member countries. On several occasions it has emphasised the need to train an adequate labour force at this level.

In order to clarify some of the aspects of this problem, the Committee has sponsored surveys which will allow an analysis to be made of the situation existing in several Member countries with regard to the training of technicians and the abilities and knowledge used in their functions. These studies thus form the basis of a constructive exchange of experience and are of more direct profit to each of the countries concerned.

On the completion of each of these surveys and on the basis of the data compiled, confrontation meetings between two or more countries are organised; groups of experts delegated by each of the countries examined, and presided by a Chairman from another Member country, jointly discuss their problems in order to decide questions of educational policy or any technical problems which might arise in implementing such policy.

This report, which is part of a series dealing with technicians, was prepared by the Secretariat after the confrontation meeting between France and the United Kingdom. It is based mainly on the draft reports on the training of engineers of non-university level and of technicians in France, prepared by an ad hoc FEANI/EUSEC Joint Committee (1), and on a survey in France on the functions of technicians in industry.

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(1) FEANI - European Federation of National Associations of Engineers
EUSEC - Conference of Engineering Societies of Western Europe and the United States of America.

Part One

GENERAL ORGANISATION OF EDUCATION

I. GENERAL REMARKS - PLACE OF TECHNICAL EDUCATION IN THE EDUCATIONAL SYSTEM

In France, education is governed by the following basic principles:

(a) Compulsory school attendance lasts 10 years, from 6 to 16, for children who were 6 years old in 1959. This reform will be introduced gradually and will be in general application as from 1972;

(b) Ordinary State education is non-fee-paying, but a registration fee has to be paid at the universities;

(c) State education is non-denominational, but in addition to the State schools there are private establishments, some denominational, others not, which may receive financial assistance from the State under certain conditions prescribed in the Act of 31st December 1959, and which are subject to State inspection; In addition, so far as technical education is concerned, the Act of 25 July 1919, by establishing State recognition of certain private schools under specified conditions, foresaw that these establishments world be able to benefit from subsidies and would therefore be subject to inspection by the Directorate for Technical Education, under the same conditions as State schools;

(d) Official degrees and diplomas are awarded on the basis of public examinations open to all students;

(e) Instruction is given full-time by teachers with the status of civil servants and generally attached directly to the Ministry of Education.

The reform of January 1959 reaffirmed the basic principles but slightly modified the structure of education. Compulsory attendance was increased from 8 to 10 years. The Decrees of 1962 and 1963 modified the nature of the first "observation and orientation cycle" (4 years), introduced in 1959. The corresponding syllabus has gone to the "collèges d'enseignement secondaires" which regroup all pupils entering the 1st year (classe de 6e). General and technical education have thus been merged, technical education now being no more than an option offered to pupils at the end of the 1st cycle.

At the end of their 4th year (classe de 3e) pupils who do not go to either the classical or the modern stream have a choice between three possibilities:

1. Short technical training: given in technical secondary schools and in 2nd period establishments.
2. Full-length technical education (theoretical): leading to the scientific or technical baccalauréat and thereafter to the preparatory courses for the engineering colleges.
3. Full-length technical education (practical): leading to the "Brevet de technicien" (there are still a few preparing for the ENP - écoles nationales professionnelles - certificate but this is now finishing).

In future the final certificate will be either the "brevet de technicien" (see series of Decrees of 13,15,18,20,21,23,25 April 1966 and Orders of 24th March and 4th April) or the "baccalauréat de technicien" in the future title of certain "brevets de technicien" in the more difficult specialisations.

Additional information on the French educational system is given in Appendix I.

Syllabuses are prepared and put into practice in the same way as for classical and modern education, and representatives of the various trades may intervene in an advisory capacity through the "Commissions nationales professionnelles consultatives (CNPC)", advisory committees containing Government, employers' and workers' representatives.

The directorate for technical education created in 1960 was dissolved in 1961, thus giving further proof of the wish to merge all the different forms of education into one.

In his reform of technical education, the Minister of Education was guided by the following general principles:

- To delay the start of technical and vocational training in order to permit better orientation of pupils;
- To place technical education on the same footing as classical and modern education;
- To continue having identical types of training for the industrial, economic (commercial), social welfare or hotel sectors;
- To reduce the length of technical and vocational training by basing it on better general and theoretical education;
- To reduce the number of specialised diplomas by grouping them, wherever possible, into trade-group diplomas;
- To make training less specialised in order to facilitate adjustment and retraining during the subsequent career;
- To make the universities responsible for training higher technicians.

While acknowledging the merits of the reforms introduced, the representatives of the various trades have nevertheless expressed their fears with regard to two main points:

- Reduction in the degree of specialisation, this may have the effect of supplying technicians who will not be immediately capable of performing their duties in the firm, owing to lack of practical training;
- Reduction of the number of hours devoted to specialised technology and to practical work in the shops.

The preparation of the CAP (certificat d'aptitude professionnelle) will in future be the responsibility of the firm, since the technical colleges will prepare students for the BEP (brevet d'enseignement professionnel).

In its recent motion on technical and vocational education, the Comité national du Patronat français "hoped that practical terminal education would end with effective preparation for employment" and "indicated its concern regarding technician syllabuses which allotted too little time to technical and practical subjects."

II. EDUCATIONAL AND VOCATIONAL ORIENTATION AND GUIDANCE

One of the aims of the Decree of 6th January 1959, on the reform of State education, supplemented by the Order of 2nd June 1960, was to establish a new system of orientation to enable pupils to follow courses suited to their abilities and preferences, and not merely on the basis of family and social traditions.

All children admitted to 1st cycle courses will have to pass three levels of orientation:

- The first is at the end of the first term in the first year of secondary education (age 11, "classe de 6e"). The Conseil d'orientation (Orientation Council) informs parents what type of course (classical or modern) is best suited to their child's abilities; parents are free to decide what they please.
- The second is at the end of the second year of secondary education (age 12, "classe de 5e"). Children may be directed by the Conseil d'orientation towards the specialised streams of general education or towards agricultural education.
- The third and decisive level is at the end of the fourth year (age 14, "classe de 3e"), i.e. at the end of the orientation cycle. Children may be directed to:
  - establishments taking children up to the end of their compulsory attendance;
  - short general or technical education;
  - full-length general or technical education;
  - agricultural education.

At the end of the second and fourth years, families have two possibilities:

1. To choose the form of education recommended by the Conseil d'orientation, which the child will then be entitled to follow automatically;
2. To choose another type of education, for which an entrance examination is compulsory.

"Transition" classes provide for any necessary re-orientation. (There are still, in fact, too few of these). There are two kinds of orientation bodies:

- The "Conseils de classe" (Class Councils) consist of all teachers of the same class who meet, generally once a month, to consider the case of each pupil. Their work is directed by the Principal Teacher and the Assistant Principal Teacher, both of whom are appointed by the Headmaster.
- The "Conseils d'orientation" (orientation Councils) are responsible for pupils in a group of 5 to 8 classes of the same level. They meet quarterly and consist of the Principal Teachers of the classes in question and their Assistants, an educational and vocational guidance expert, a school doctor and possibly a welfare assistant.

In each "département" (county) a "Conseil départemental d'orientation", presided by an "inspecteur d'Académie", (1) is responsible for organising orientation activities among the various Councils and for making proposals for the preparation of the education map (geographical distribution of educational establishments).

At national level a "Conseil ministériel d'orientation", presided by the Minister of Education, is responsible for promoting the organisation and improvement of orientation methods in the various types of education.

Any pupil who so desires may consult a "Centre d'orientation scolaire et professionnelle" (Educational and Vocational Guidance Centre). Such Centres exist in all départements and there are at present over

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(1) Representing the Rector of the Academy in the "département".

300 of them. They are attached to the Sub-Directorate of Educational and Vocational Guidance in the Ministry of Education through the Inspectors of the educational and vocational guidance services of each Rectorate (university district).

The tests and methods used are those established by the "Institut national d'étude du travail et d'orientation professionnelle" (National Institute of Work Study and Vocational Guidance) which along with other regional institutes (the Universities of Lille, Caen, Bordeaux, Marseille) trains the future guidance counsellors.

A project is now under preparation to remerge vocational guidance and information : the setting up of an "Office national de l'information et de l'orientation scolaire et professionnelle" (National Information office for Educational and Vocational Guidance) which will regroup existing services i.e. OSP (Educational and Vocational Guidance); BUS (University Bureau of Statistics - and certain services in IPN (National Pedagogical Institute).

III. AUTHORITIES RESPONSIBLE FOR EDUCATION

- CO-ORDINATION AND PLANNING -

(a) Ministry of Education

The Decree of 1st June 1960 set up a General Directorate containing three specialised Directorates dealing with:

- Elementary and full time education until the end of compulsory schooling;
- Classical and modern education;
- Technical and vocational education.

The result of this was that classes attended by pupils of the same age were placed under the authority of different Directorates, according to the type of establishment to which they belonged.

The Order of 9th October 1960 introduced a structural modification by setting up a General Directorate of Organisation, to which were attached:

- The Directorate of Personnel and of Elementary Establishments;
- The Directorate of Educational Organisation;
- The Directorate of Studies and Higher Technical Education.

In this way each Directorate was made responsible, according to its functions, for all secondary pupils.

The abolition of the Directorate of Technical Education was designed to integrate technical and vocational education with general education. The Decrees of 15th October 1963 and 14th March 1964 and the Order of 16th March 1964 maintained this intention, while proceeding with organic reforms.

The General Secretariat set up in 1962 covers all the Ministry's activities (See Annex II) and, so far as teaching is concerned:

The Directorate for Higher Education, responsible on the one hand for the organisation and management of higher educational establishments, for studies and examinations in universities and equivalent institutions, and for university teachers; and on the other hand for organising and deciding syllabuses in establishments training higher technicians. In this Directorate, a "Commission pédagogique provisoire des IUT" (Provisional Commission on Teaching in University Institutes of Technology), consisting of representatives from the government and employers has been set up to advise the Minister on the Organisation of University Institutes of Technology (IUT) as provided in the Decree of 7th January 1966

The Directorate for Teaching Methods, School Education and Orientation is responsible for questions concerning the teaching, education and guidance of pupils in general, special and technical educational establishments, excluding higher technical education establishments. It examines syllabuses, methods and school organisation, takes part in the regulation, organisation and management of the various types of schools.

This Directorate comprises a Sub-Directorate of Technical and Vocational Matters, responsible for the "Haut Comité de l'orientation et de l'enseignement technique" (High Committee for Guidance and

Technical Education), the "Commissions nationales professionnelles consultatives" (CNPC) (National Vocational Advisory Committees) and for agreements with the trade associations (Bureaux des professions réglementées et de l'éducation professionnelle obligatoire).

The Directorate for Teaching Staff in General, Technical and Vocational Education, responsible for the recruitement and administration of staff in teaching, supervisory inspection or school management posts.

The Directorate for School, University and Sports Equipment responsible for the execution and supervision of building programmes, and for organising the administrative and financial side of school and university building projects.

(b) Ministry of Agriculture

Responsible for agricultural education and for agricultural collèges and lycées.

(c) Ministry of Social Affairs

Responsible for Adult Vocational Training (FPA) and currently engaged on a technician training programme.

(d) Other Ministries

Other Ministries, e.g. Defence, Health or Public Works, have their own establishments, but their graduates are used directly by the Government Departments to which such specialised centres are attached.

Part Two

TRAINING OF TECHNICIANS

I. DEFINITION AND GRADING OF TECHNICIANS

- STANDARDISED QUALIFICATIONS -

It should be noted that there is little relation between the title of technician used in diplomas awarded by the Ministry of Education and the classifications used in industry, which are generally determined by collective agreements on the basis of the post held and the duties performed.

It is possible that this difference in interpretation will gradually diminish as the number of trained technicians increases and the syllabuses established in conjunction with industrial representatives become more in line with the requirements of industry.

Decree No. 59-57 of 6th of January 1959, concerning the reform of State education, established three certificates under Articles 33, 34 and 35, in the following ascending order:

- Brevet d'agent technique (Technical Assistant's Certificate) ;
- Brevet de technicien (Technician's Certificate) ;
- Brevet de technicien supérieur (Higher Technician's Certificate).

Subsequently amendment were made to the initial texts, and these will be considered later. These certificates are awarded in both the industrial and the commercial sectors. They are generally prepared in State establishments, but courses are also available in private establishments, by correspondence, or under adult vocational training programmes, as the case may be.

At the time this study was carried out, the educational reform provided by the 1959 regulations was in process of implementation. There were two consequences of this:

1. The old system was still applied at the same time as the new system was being introduced;
2. Part of the measures provided by the new system had been implemented and certain modifications had been found necessary.

It has therefore seemed expedient to describe, wherever possible, the old system, the new system and any probable modifications.

(a) Syllabuses

The syllabuses for the various grades of technician's certificate are established by the Directorate of Teaching Methods, School Education and Orientation of the Ministry of Education in conjunction with the appropriate advisory bodies.

Syllabuses apply to all French State establishments and to French private establishments which have concluded a contract of association with the Government.

(b) Final examinations

Examinations are organised at national level or in each academy, as the case may be.

An interesting point is that there is no condition of compulsory school attendance before sitting any duly designated "public" examination, and any candidate who has prepared such an examination in a State or private establishment, by correspondence or by any other means, is entitled to sit.

(c) Certificates and diplomas

Certificates and diplomas awarded on the results of examainations organised by the Ministry of Education have official value, as have also some of the examinations and diplomas of private establishments recognised by the State.

II. TRAINING OF JUNIOR TECHNICIANS WITHIN THE EDUCATIONAL SYSTEM

1. "Agents techniques" (Technical Assistants)

(a) Old system

The certificates in question were the "brevets d'enseignement professionnel", established by the Decree of 22nd January 1949. They were prepared in the fifth and sixth years (classes de seconde et de première) of the colleges and lycées techniques.

A probatory examination had to be taken at the end of the fifth year (classe de 2e) and a final examination at the end of the following year (classe de lère). The certificate was usually obtained at the age of 17. The educational reform provides for it to be replaced by the "brevet d'agent technique".

There were several types of certificates according to the industrial sector concerned which required three or four years.

"Brevet d'enseignement industriel" (BEI) (Certificate in Industry) with numerous options covering the main industrial sectors:

- Metals and metallurgy;
- Mechanical engineering;
- Electrical industries;
- Building and civil engineering;
- Chemical industries;
- Timber industries;
- Leather industries;
- Textile industries;
- Clothing industries;
- Paper industries, etc.

There were about sixty specialisations for the BEI.

"Brevet d'enseignement hôtelier" (BEH) (Certificate in Hotel Management)

"Brevet d'enseignement social" (BES) (Certificate in Social Welfare)
Chiefly intended for girls, with two options:

- Medical and social welfare secretary;
- Bursar's clerk.

"Brevet d'enseignement commercial" (BEC) (Certificate in Business Affairs) Four options:

- Secretarial;
- Commerce;
- Accounting;
- Business administration.

There was also a "brevet supérieur d'enseignement commercial" (BSEC) (Higher Certificate in Business Affairs) and had five options:

- Secretarial;
- Data processing;
- Commercial translation;
- Accounting;
- Distribution.

However, the "brevet d'enseignement professionnel" was not popular with industry, particularly the metallurgical industries, as its syllabus was not considered adequate. Holders were regarded as being inferior in practical knoledge to CAP holders and inferior in theoretical knowledge to the graduates of the old "écoles nationales professionnelles".

(b) New system

Article 33 of the Decree of 6th January 1959, as amended by the Decree of 3rd August 1963, stated that the training of "agents techniques" would normally last two years and would be given in "lycées techniques" and assimilated establishments. Its aim would be to prepare skilled workers, some of whom would be able to rise to foremen.

The title of "agent technique breveté" would be obtained after a public examination and a period of practical work in a firm.

However, the trade representatives made the same objections to the "brevet d'agent technique" as to the "brevet d'enseignement professionnel". and in the end the BAT was not established.

The "brevets d'enseignement professionnel" were abolished, except for the paper and clothing industries, where training was considered satisfactory.

As a transitional measure BEP courses will be available in all specialisations up to 1967.

(c) Probable modifications

No modification is foreseeable at the present stage.

2. "Techniciens" (Technicians)

(a) Old system

Technicians were trained in the "écoles nationales professionnelles" (ENP) - industrial or commercial - which date from 1903. Courses lasted six years (classes de 5e, 4e, 3e, 2e, lère, terminale), but in certain circumstances candidates might be admitted directly to the "3e" or "2e".

The diploma was awarded on the basis of the marks obtained throughout the candidate's whole course, generally at the age of 18.

Courses covered 44 hours per week, evenly distributed between general education, theory and practical work.

ENP training was very highly regarded in industry.

Under the 1959 reform the ENP were converted into "lycées techniques".

(b) New system

Article 34 of the Decree of 6th January 1959, as amended by the Decree of 3rd August 1963, states that technician training will normally last three years (classes de 2e, lère, terminale) and will be given in "lycées techniques" and assimilated establishments.

The aim is to prepare skilled workers capable of subsequently rising to the level of middle management.

The title of "technicien breveté" is awarded after a public examination and a period of practical work in a firm, or in the workshop of a recognized educational establishment. In certain circumstances (to be defined) this diploma should give access to the university.

The training prescribed in the Decree began in the school year 1963-64 and the first "technicien breveté" will gradute from the "lycées techniques" in 1966.

Students enter the "lycées techniques" on completing the orientation

cycle at 15 and diploma should be obtained at 18. The specialisations which can be taken are fixed by Ministerial Order. (See Series of Orders dated 13, 15, 18, 20, 21, 23, 25 April 1966, and Orders dated 24 March and 4 April 1966).

The trade representatives fear however, that training will be inferior to the old ENP training since the reduction made in the standard weekly timetable has been at the expense of specialised technology and practical work in the shops.

The timetable was, in fact, too heavily loaded. Experience has shown that technical progress makes it unnecessary for techniques to be taught in great detail. Refresher courses and in-career training seem to be the best solution for the future.

The "classe de 2e" (5th year) in the "lycées techniques" is common to all students, and it is only after this class that students split up take either the "diplôme de technicien" or the "baccalauréat technique".

A summary of the weekly timetable for the "brevet de technicien" in the mechanical engineering sector is given below. The detailed timetable is given in Annexe III.

Table 1

Weekly timetable for the "brevet de technicien" in mechanical engineering

Type of Subjects	5th year (2e)	6th year (lère)	7th year (terminale)
Arts	9 hours	5 hours	5 hours
Science	10 "	8 "	10 "
Fine Arts	1 "	1 "	-
Technical	16 "	22 "	21 "
P.T.	4 "	4 "	4 "
Total	40 hours	40 hours	40 hours

(c) Probable modifications

The number of specialisations will probably be reduced and the majority of the certificates regrouped into three main specialisations:

- Mechanical engineering;
- Electrical engineering;
- Electronics.

The certificates in these three specialisations would take the name of "baccalauréat de technicien", not to be confused with the "baccalauréat technique" which would continue to exist at the same time. Certificates in the other specialisations retained would keep the name of "brevets de technicien".

Here we see the Government's desire that, at all levels and wherever possible, specialised diplomas which had become too numerous should be regrouped and amalgamated into trade group diplomas.

On the other hand, the trade representatives seem to fear that the result of such training will be a supply of under-specialised technicians who would not be of immediate use in undertakings .

III. TRAINING OF HIGHER TECHNICIANS WITHIN THE EDUCATIONAL SYSTEM

In France there is no legal definition of the word "ingénieur", but the title of "ingénieur diplômé", followed by the name of the school conferring the title, is protected by the Act of 1934. Each year the "Journal Officiel" publishes a list of the schools authorised to confer the title.

However, having regard to the length of courses, the subjects taught, the teaching methods used and the training given, we might say that the "technicien supérieur" is the equivalent of the "ingénieur" graduate of the German "Ingenieurschulen", of the Belgian "ingénieur-technicien" or of the Dutch "Register-Ingenieur".

In some cases the "technicien supérieur" may perform the functions of an "ingénieur" and receive the benefits accorded to that occupational

category: he is then said to be an "ingénieur assimilé", but the assimilation is valid only in the undertaking which granted it and may be lost on leaving.

(a) Old system

The origin of the "brevet de technicien supérieur" lies in the addition of specialisation years to ENP courses.

Decree 52-178 of 19th February 1952 instituted the "brevet de technicien" by establishing a special examination.

Decree 57-972 of 26th August 1957, on technician training provided that except in exceptional cases, courses in the ENP technician sections of certain technical colleges and assimilated establishments would last two years. This decree also reclassified the old "brevets de techniciens" (Decree 52-178 of 19 February 1952) and assimilated then to "brevets de techniciens supérieurs".

The specialisations in which "brevets de techniciens" were created were determined by Ministerial Order.

(b) Present system

Article 35 of the Decree of 6 January 1959 stated that "techniciens supérieurs" would be trained in special sections or schools, each of which would have appropriate syllabus of adequate duration for the specialisation in question. Students would be drawn from the "techniciens brevetés", or from general education (classical, modern or technical) baccalauréats or from the further education courses leading to promotion at work. The title of "technicien supérieur breveté", mentioning the specialisation, is conferred at the end of the course.

Article 1 of Decree 62-216 of 26 February 1962 stated that the provisions of Article 35 of Decree 59-57 of 6th January 1959 regarding training of higher technicians would come into force at the beginning of the school year 1962-63.

The "brevet de technicien supérieur" (BTS) (Higher Technician's Certificate) must be prepared in 2 years in the "lycées techniques" after three years of full-length education (general or technical) and between the ages of 18 and 20. The "Bulletin Officiel de l'Education nationale"

No. 25 of 20th June 1963 gave a list of 42 BTS specialisations.

This certificate is awarded on the basis of a public examination. BTS holders who have not passed the baccalauréat may be admitted to the university.

Parallel to the BTS, a "diplôme d'études supérieures techniques" (DEST) (Diplôma of Higher Technical studies) was created, which can be taken in three different ways:

1. In the faculties of science (Decree of 5th May 1961). The course consists of one year "propédeutique" (preparatory university course), one of the certificates of a university degree, a certificate in technology, and 9 months' practical work.
   One of the aims of this university training is to retrieve students who had begun a degree course but had not been able to finish it. The results have not been very satisfactory, however, and this DEST will be abolished when the IUTs are working. The other two methods come under adult vocational training.
2. In the university "instituts de promotion supérieure du travail" (high level adult vocational training institutes). Part-time courses last 3 or 4 years, in some cases, it is possible to finish with a full-time course, particularly for an engineering diploma. In 1964, 10 Institutes were preparing for 20 types of DEST in different specialisations.
3. At the "Conservatoire national des Arts et Métiers" (CNAM) and its associated centres. This case will be discused in greater detail in the section on Adult Vocational Training.

(c) Probable modifications

The variety of methods for training "techniciens supérieurs" was bound to prejudice this category. In order to unify types of training, Decree 66-27 of 7th January 1966 established the "instituts universitaires de technologie" (IUT) (University Insitutes of Technology) which are establishements of higher education.

The Decree states that IUT are established in the form of university institutes and shall provide higher education preparing directly for technical supervisory posts in production, applied research and services. The list of specialities taught is fixed for each Institute

by Order of the Minister of Education. Courses last 2 years full-time.

Holders of the baccalauréat or its recognised equivalent, or the "baccalauréat du technicien" are eligible for admission. An entrance examination may be held for other candidates, in conditions determined by Order of the Minister of Education.

Teaching staff may be drawn from higher education, from technical education (teachers of higher technician streams) or from industry (engineers and managers).

With the gradual establishment of the IUT establishments preparing for the corresponding BTS and the DEST will be abolished.

Faithful to its policy of reducing the number of specialised diplomas, the Ministry of Education is intending to regroup the various "diplômes de techniciens supérieurs" into 10 sections:

7 for the secondary sector

Mechanical engineering; civil engineering; energy; electronics and automation; chemical engineering; applied biology; laboratory metrology.

3 for the tertiary sector

Management techniques (with three options); local government administration; information techniques.

Before the Decree of 7th January 1966 and had even been signed, five specialised IUT began to operate experimentally as from November 1965:

Rouen	specialising in	Chemical Engineering
Nancy	"	" Applied Biology
Paris-Cachan	"	" Electronics
Toulouse	"	" Mechanical Engineering
Paris Saint-Remy-les-Chevreuse	"	" Civil Engineering

Syllabuses are experimental and liable to be modified.

Candidates for admission must have the "baccalauréat" of the "brevet de technicien" corresponding to the IUT department they wish to enter.

It is expected that about 20 IUTs with a total of 125,000 students will be operating in 1972. IUT students will account for about 25 per cent of total undergraduates.

Table 2 gives the list of the various BTS specialisations.

Table 2

List of "Brevets de technicien supérieur" - Specialisations -

Aeronautics
Biological Analyses
Assitant Engineer
Building
Building Trades
Biochemist
Research Office
Boilermaking
Chemist
Cinematography
Accounting
Home Economics Adviser
Metal Structures
Shipbuiding
Control and Regulation
Radiation Control
Dietetics
Electronics
Electrical Technician
Industrial Arts
Mechanical Engineering
Foundry (Patterns)
Foundry (Metal Moulds)
Forging - Stamping
Cold Storage
Chemical Engineering
Geology - Prospecting
Plastics
Data Processing
Precision Engineering
Internal Combustion Engines
Optician
Optical Instruments
Physicist
Advertising
Secretarial
Technical-Commercial
Tourism
Commercial Translator
Technical Processing
Civil Engineering
Surveying

Source : "Bulletin officiel de l'Education nationale", No.25 of 20.6.1963.

Table 3

IUTs established during the year 1966/67

	Metal structures	Electronics	Power	Information	Applied biology	Chemistry	Civil engineering	Business administration	Total	Observations
Bordeaux	+	+							2	
Grenoble	+		+	+				+	4	
Lille		+							1	
Montpellier . . .				+					1	
Nancy					+				1	
Nantes		+						+	2	Angers Angers
Orléans						+			1	
Paris		+				+	+		3	Orsay and Cachan Date to be fixed
Poitiers			+						1	
Reims	+						+	+	3	
Rennes		+							1	
Rouen						+			1	
Toulouse	+						+		2	
	4	5	2	2	1	3	3	3	23	

IV. VOCATIONAL TRAINING WITH IN THE EDUCATIONAL SYSTEM

The aim of vocational training is to train skilled workers who generally begin their working life in the category of "ouvrier professionnel".

(a) Old system

After the "certificat d'études primaires" (Certificate of Primary Studies), students went to apprenticeship centres, "collèges techniques" on the specialised sections of "collèges d'enseignement général" for three years to prepare a "certificat d'aptitudes professionnelles" (CAP) (Certificate of Proficiency) awarded on the results of public examination.

The CAP had several hundred specialisations. Courses lasted theoretically from the age of 14 to 17. A large number of students prepared for the CAP examination in training courses organised by their firm or by intertrade organisations, with a minimum attendance of 150 class hours per year.

(b) Present system

Article 32 of the Decree of 6th January 1959, as amended by the Decree of 3rd August 1963, states that training of skilled workers will normally last two years. Training is given in "collèges d'enseignement technique and in assimilated establishments. At the end of the course the "certificat d'aptitude professionnelle" is awarded on the basis of a public examination.

Courses begin after the first cycle and normally last from 15 to 17. Table 4 gives the number of students who sat and who passed the various CAP examinations in 1962 and 1963.

Table 4

Number of candidates and passes at the "Certificat d'aptitude professionnelle"

Students	1962	1963
Sat	232,778	260,501
Passed	128,109	144,693

Source: "Informations statistiques de l'Education nationale".

(c) Probable modifications

Continuing its policy of regrouping diplomas, the Government has decided to establish "brevets d'études professionnelles" by trade groups, to be prepared in 2 years after the end of the first cycle in industrial, commercial and administrative sectors. By the use of appropriate methods, general knowledge will be adapted to industrial practice.

The CAP will be retained for particular specialisations, but training will probably be given more and more in the firm or through interfirm organisations.

Lastly, a "certificat de formation professionnelle" (Certificate of Vocational Training) can be prepared in one year.

V. TRAINING OF ENGINEERS

In general, engineers are not trained in the universities (apart from ENSI (1) which is attached to the University), but in special schools of varying levels and types. Entrance is generally on the basis of a competitive examination, for which students are prepared in the "mathématiques supérieures" (Higher Mathematics) and "mathématiques spéciales" (Special Mathematics) classes of the lycée after they have obtained their Baccalauréat.

(1) ENSI: Ecole nationale supérieure d'ingénieurs.

These schools include:

(a) The "grandes écoles d'ingénieur", each of which draws up its own syllabuses and regulations, and which are attached to different Ministries or private organisations. Courses last 3 or 4 years. Some give general training and others specialised training.

(b) The "Ecole nationale supérieure des Arts et Métiers" and its regional centres, which in 4 years train engineers who are in great demand in the engineering and metal-working industries. Two Catholic schools (Lyon and Lille) are assimilated to them, and some State engineering schools: "Ecole nationale de radiotechnique et d'électricité appliquée de Clichy" (ENREA) "Ecole nationale d'ingénieurs de Strasbourg", "Ecole nationale supérieure de céramique de Sèvres".

(c) Institutes such as the "Institut supérieur de chimie industrielle de Rouen" and the "Institut supérieur des matériaux et de la construction mécanique" grant engineering certificates. The courses last 4 years.

(d) The "instituts rattachés aux universités" (University Institutes) which were converted in 1947 into "écoles nationales supérieures d'ingénieurs" (ENSI). Courses last 3 years.

(e) An entirely new type of Institute: the "Institut national des sciences appliquées". The first two were established at Lyon-Villeurbanne and Toulouse. Courses last 4 years.

(f) The "écoles nationales d'ingénieurs" (ENI) at Belfort, Brest, Metz and Saint-Etienne, have four-year post-baccalauréat courses generally for processing engineers.

(g) The "Conservatoire national des Arts et Métiers" also confers a "Diplôme d'ingénieur"; this is mainly for technicians who are working in industry.

(h) Various private schools (e.g. Ecole Bréguet). These are of very different levels, and for this reason the title of "ingénieur" is always followed by the name of the school conferring it. The "Commission du titre de l'ingénieur", in the Ministry of Education, decides each year the schools authorised to confer a "diplôme d'ingénieur".

VI. RECRUITMENT AND TRAINING OF TECHNICAL TEACHERS

It was pointed out above that the Ministry of Education no longer considers technical education as a separate type of education, but as a special option available at the end of the first cycle, on the same footing as classicial or modern courses.

The "lycées techniques" accept candidates for the "baccalauréat technique" and also the "brevet de technicien". Moreover, just as there are technical streams in the classical or modern lycées, so there may be modern or classical streams in the technical lycées. But since the reform of the classical, modern and technical lycées, there is much more talk about lycées being able to take in all the streams. This explains why some teachers of general subjects e.g. French, mathematics or modern languages, are common to all three major types of education.

For the sake of clarity, only training directly geared to technical education will be considered in this study.

The basic establishment for training technical teachers is the "Ecole normale supérieure de l'enseignement technique" (ENSET) at Cachan.

There are 4 main categories of teachers:

- For general subjects: Teachers holding the "agrégation" and certificated teachers
- For technical subjects: Principal Technical Teachers and Assistant Technical Teachers.

(a) General subjects

The basic establishment is ENSET, to which young people of both sexes aged 18 to 23 are admitted on the results of a competitive examination. They must already hold the baccalauréat. Courses last 4 years at most, and lead to the "licence d'enseignement", the CAPET (1) and the "agrégation".

(i) Agrégation

The "agrégation" is a competitive examination for persons holding a "licence d'enseignement" or a "diplôme d'études supérieures". When the new reform of higher education is applied, a Master's degree will

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(1) CAPET: Certificat d'aptitude au professorat de l'enseignement technique.

be required. Candidates may prepare for it in the universities and the "écoles normales supérieures".

The "agrégation" consists of two eliminatory tests and a final oral. Candidates who pass the first two tests but fail the final oral are "bi-admissibles" and have a special status.

(ii) CAPET

The "certificat d'aptitude au professorat de l'enseignement technique" (CAPET) (Certificate of Proficiency in Technical Teaching) is a competitive examination for persons holding a "licence d'enseignement", a group of certificates, or a "diplôme d'ingénieur". Candidates may prepare for it in the "instituts préparatoires aux enseignements du second degré" (IPES). It consists of a theoretical and a practical part: the theoretical part includes a written paper and one or more orals.

Students of an Ecole normale supérieure holding a "licence d'enseignement" are exempt from the written papers. IPES students enjoy the same exemption for two sessions.

Candidates who pass part one of the CAPET finish their teacher training in a "Centre régional pédagogique" (CPR) (Regional Teacher's Training Centre) before preparing part two.

It has now been decided to merge CAPES and CAPET so that in future there will be one competitive examination with several options.

(b) Technical subjects

Starting at the bottom, the grades of Teachers of technical subjects, practical work, of specialised technology in the "lycées techniques" are Assistant Technical Teacher (PTA); Teacher of technical theory (PETT); Technical Teacher, head of work shop. The last named are recruited as required from among the first two categories; they are responsible for the workshop and for co-ordinating the work of the technical teachers.

(i) Principal Technical Teachers

Principal Technical Teachers are recruited as required among the Assistant Technical Teachers. They perform the same functions as the latter, but are generally responsible for higher classes or for co-ordinating practical work in the workshops.

The recruitment and training of teachers responsible for practical work, i.e. Assistant Technical Teachers (PTA) and Teachers of Technical Theory, is undertaken by ENSET for technical lycées and by ENNA (écoles normales nationales d'apprentissage) for the "collèges". Candidates must have either the BTS (brevet de technicien supérieur), or two CNAM certificates or equivalent, or industrial or business experience with practical training.

(c) Number of teachers per class

It is extremely difficult to establish accurate statistics, since many teachers overlap and teach in various departments e.g. modern and technical streams, or preparatory classes for the "baccalauréat technique" and the "baccalauréat de technicien". The most accurate figures are probably those of the Commissariat du Plan.

The teacher/student ratio, which was 1/32 in 1960-61, should vary as follows:

Table 5

Trend of teacher/student ratio

Year	Ratio
1965-66	1/31.3
1966-67	1/31
1967-68	1/30.8
1968-69	1/30.5
1969-70	1/30.3
1970-71	1/30

Source: Fifth Development Plan.

The Plan forecasts classes of 30 in the "lycées techniques" in the school year 1972-73. In the light of this figure and of student and teacher time tables, 10 teachers would be required for 216 students in the fifth year (classe de 2e) and for 260 students in the sixth and seventh year (1ère and terminale).

(d) Teachers' salaries

The salaries given here are those in force at the beginning of 1966. In each case the possible minimum and maximum have been taken into consideration.

Table 6

Teachers' monthly salaries

In Francs 1966

Category	Minimum		Maximum	
	Index	Salary	Index	Salary
"Agrégation" holders . . .	297	1,106.58	720	2,831.66
"Bi-admissibles"	277	1,032.08	627	2,336.08
Certificated teachers . .	258	961.25	597	2,224.33
PTA	243	905.41	483	1,799.59

Source: "Syndicat national de l'enseignement technique".

This basic salary is increased by a monthly residence allowance varying between 6 per cent and 20 per cent of basic according to the place of residence, and in certain cases, by a family allowance. Payment is also made for overtime.

Some teachers in private establishments which have concluded an agreement with the Government have the same salary as their colleagues in State education. Otherwise salaries vary according to the establishment and are generally substantially lower than in State schools.

VII. TRAINING OF TECHNICIANS OUTSIDE THE EDUCATIONAL SYSTEM

(a) Training of technicians through adult training schemes

(i) Adult Vocational Training

Facilities have always been granted to persons wishing to improve their vocational knowledge by taking part-time courses while continuing to work in their firm.

The Government wished to establish a framework which would embrace all such activities, both official and private. The Act of 31st July 1959, therefore established a series of measures grouped under the heading of "Promotion sociale" (adult vocational training).

Two types of training were established: the first covers the training of second-degree technicians, while the second covers the training of higher technicians. Table 7 gives a general outline of the organisation of adult vocational training.

Public and private bodies provide courses leading to levels 3 and 4, in particular local authorities (evening classes organised by the City of Paris), undertakings (Renault), groups of undertakings (Fédération des industries mécaniques et transformatrices des métaux, FIMTM).

In certain cases, students may interrupt their jobs to follow full-time courses. Compensation is paid to students in the high-level courses for loss of salary.

The "brevet professionnel" (BP), equivalent to the "brevet de technicien", and the DEST of the Conservatoire national des Arts et Métiers (CNAM) will be considered below.

The whole of the vocational training instigated, controlled or encouraged by the various ministerial departments affects 300,000 persons of whom 240,000 are being trained under National Education Sch mes; it is considered that these figures should be doubled if not tripled if they are to meet the ever-growing requirements due to the expansion of the production and service sectors.

Table 7

General organisation of adult vocational training

ADULT VOCATIONAL TRAINING

1st Degree:

Level 1	: Training of semi-skilled workers or clerical workers without any special vocational qualification.
Level 2	: Training of skilled workers or clerical workers. Commercial CAP examination.
Level 2 bis	: Training of skilled and highly skilled workers. Industrial CAP examination.

2nd Degree:

Level 3	: Training of technical assistants, chargehands, or assimilated workers.
Level 4	: Training of technicians or middle managers. "brevet professionnel" or "brevet de technicien" examinations.

HIGH-LEVEL ADULT TRAINING

3rd Degree:

Level 4 bis	: Preparatory cycle.
Level 5	: Training of higher technicians or managers, or leading on to Level 6. DEST examinations of CNAM and University Insitutes ("instituts de promotion supérieure du travail des universités").
Level 6	: Training of engineers or top managers.

Source: "Le Technicien", No. 113-114.

(ii) "Brevet professionnel" (BP)

Under the adult vocational training schemes, the Brevet professionnel certifies that the craftsman has become highly skilled in his job and is qualified for eventual promotion to foreman (for example, works foreman in building).

Except in certain cases of the commercial BP, these courses are designed solely for students already working in industry, who must have two years' industrial experience when they sit the final examination. Courses are therefore part-time, and are given in all occupational specialisations, both in Paris and the provinces.

Although no preliminary examination is required - elimination where necessary occurring automatically during the first year - the entrance level is roughly that of the CAP. The average age of students is 18 to 21.

Courses used to cover two years, but three years is becoming more frequent, the first being considered as a preparatory year.

Courses are theoretical and in some cases practical. They are organised at firm level, by joint bodies representing several firms, or by establishments attached to the Ministry of Education.

Syllabuses are drawn up by the "Commissions nationales professionnelles consultatives" (National Vocational Advisory Committees) of the Ministry of Education, consisting of representatives of Government, management and labour. These Commissions also determine the specialisations in which courses should be available.

Examinations consist of a theoretical part and a practical part, each rating 20 points; very good workers are thus favoured. Examination subjects are determined at departmental level, but there is a tendency to establish them in academic districts.

Teachers are mostly drawn from State schools and are usually certificated.

Annex IV shows the results of the BP examination in 1965 for the metal industries.

(iii) "Conservatoire national des Arts et Métiers" (CNAM)

The "Conservatoire national des Arts et Métiers" is directly attached to the Ministry of Education and enables adults already qualified as technicians to improve their knowledge without leaving their employment through courses held in the evening or on Saturday, and sometimes on Sunday morning. Originally courses led only to a "diplôme d'ingénieur CNAM", recognised by the State.

A decision of the CNAM Council of Administration of 20th December 1957, approved by the Ministry of Education on 24th January 1958, established a "diplôme d'études supérieures techniques" (DEST) of the CNAM in various specialisations.

In the same conditions a "diplôme d'études supérieures économiques" (DESE) was established in various specialisations on 1st July 1960.

There are at present 37 types of DEST and four types of DESE. Courses are given in Paris and in 34 associated centres, including 34 annexes. The foundation of new centres depends on the physical and human resources available and on local requirements. For the past three years live basic courses have been televised on a special network. Reception centres have been set up in the suburbs of Paris. Syllabuses applicable in all centres are drawn up by the "Conseil de perfectionnement" of CNAM, whose members are appointed by the Minister of Education. No entrance examination is held, any elimination necessary occurring automatically during the first year. The optimum level required is that of the "baccalauréat" or "brevet de technicien".

Preparatory courses are organised for candidates who have not attained this level by the Conservatoire and by various bodies e.g. lycées, trade associations (FIMTM), "Centre de télé-enseignement" at Vanves, etc. In 1965, students enrolled in the 1st year general mathematics class could be broken down as follows:

Skilled workers	9%
Technical assistants (all categories) . .	90%
Above technical assistant level	1%

The average age of students was 27.

Courses leading to the DEST generally last 5 to 6 years. To obtain the DEST, a varying number of general and practical certificates are required, depending on the specialisation. Syllabuses cover about 600 optional hours devoted to correcting problems and to project work.

At present about 400 technicians and 230 engineers graduate each year (Paris and the Provinces).

Students who so wish may study full time after the DEST to obtain the "diplôme d'ingénieur", or for the final examinations of DEST. But as the compensation for salary loss is poor, not many students make use of this facility.

It should be noted that the DEST is already more than a "diplôme de technicien supérieur". It is practically the "diplôme d'ingénieur

without the general examination and the thesis. Many students drop out during the course or try only to improve themselves at the Conservatoire without aiming as high as the DEST. Some may already have the diplôme d'ingénieur and want to specialise in another subject. If the number of certificated engineers is compared with that of the number of students registered for the first time six or seven years earlier (average length of a diploma course) the rate is roughly 9 per cent.

Two-thirds of those who obtain their DEST go on to become engineers after sitting a general examination and submitting a thesis. Students who drop out may nevertheless be considered to have improved their status. Table 8 gives a survey of CNAM examination results.

Table 8

Number of students preparing for the DEST of CNAM (Paris)

	1962-63	1963-64	1964-65
Enrolments in science, general and technical classes(1)	19,254	20,904	20,470
Examination candidates(2)	10,334	10,657	10,960
Attestations awarded(3)	3,716	4,108	3,868

Source: CNAM Information Service.

(1) This column relates to students per class, as each student may enroll for several classes. On average a student enrolls for 1.8 classes.

(2) Students who have fulfilled the attendance requirements (4/5ths of the number of classes).

(3) Most courses are prepared in 2 years. At the end of each year students must sit examinations called "Attestations". As a general rule, 12 Attestations are required to obtain a DEST.

(b) Training of technicians by the Ministry of Social Affairs

The "Association nationale pour la formation professionnelle des adultes" (AFPA) (National Association for Adult Vocational Training), formerly ANIFRMO,(1) which is administratively attached to the Ministry of Social Affairs, has established and implemented a technician training programme covering 17 specialisations assembled in 8 groups:

- Building and civil engineering;
- Metal industries;
- Footwear industry;
- Electronics;
- Electricity;
- Chemical industry;
- Plastics materials;
- Office work.

Courses are given in 12 centres, of which a list appears in Annex V. New centres are set up in the light of material resources and regional requirements, after consultation with the bodies concerned - "Commissariat au Plan", regional development bodies, etc.

Students of both sexes must be at least 20 years of age and men must have completed their military service. Candidates must pass a competitive entrance examination and a psychotechnical test. The level required varies with the specialisation, but is at least that of the BEPC.

In some cases correspondence courses are available for students preparing for the competitive examinations.

Courses are full-time and cover 44 hours per week. They last from 8 to 11 months according to the subject, and include theoretical and practical subjects.

Syllabuses are drawn up at the headquarters of AFPA after consultation with the industries concerned (management and labour).

Students must sit a final examination. Owing to the severe preliminary selection, there are very few failures and 85 per cent of students pass the final examination.

Training in the various specialisations was provided for:

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(1) Association nationale industrielle de formation rationnelle de la main-d'oeuvre (National industrial association for the rational training of man-power).

- 516 students in 1963
- 732 students in 1964
- 535 students in the first 9 months of 1965.

Students are paid during their courses on the basis of the guaranteed minimum wage (SMIG). Students already in employment and who interrupt their job to take a training-course may also obtain a special allowance intended as partial compensation for their wage loss.

The "brevet de technicien" of the FPA may in general be compared with that proposed for "agents techniques", but it implies greater practical knowledge.

FPA technicians have no difficulty in finding employment. Many of them are in practice already engaged by employers before the end of their course.

(c) Training of technicians through private training schemes

The Government has always sought to promote private technical and vocational training schemes, which are many and extremely varied. They are organised mainly by:

- Local authorities: evening classes organised by the City of Paris;
- Nationalised administrations of undertakings, e.g. SNCF (French Railways), EGF (Electricity and Gas Authority), RATP (Paris Transport), Régie nationale des Usines Renault, Charbonnages de France (French Coal Board).
- Chambers of Commerce organising part-time courses or with their own full-time schools;
- Large undertakings e.g. Berliet, Citroën, IBM, etc.;
- Joint industrial bodies e.g. FIMTM (Fédération des industries mécaniques et transformatrices des métaux), UIMM (Union des industries métallurgiques et minières), etc.

The "Association des directeurs d'écoles techniques privées d'entreprises" (Association of Headmasters of Private Industrial Technical Schools) has been formed by about 100 out of roughly 200 works school headmasters.

The organisation of public examinations and adult vocational training enables private training establishments to prepare students for these public examinations as well as for their own diplomas.

In-plant or inter-plant training may take several forms:

- Full-time preparation for a State diploma;
- Part-time preparation for a State diploma, through adult vocational training;
- Full-time or part-time preparation for a works diploma;
- Specialisation course to give holders of technical diplomas the further practical training needed for the job to be filled;
- Further training to provide workers with specific knowledge to prepare them for a change in job (retraining);
- Vocational training to give the worker the knowledge needed to obtain a higher post;
- Training to provide workers with the knowledge to allow them to obtain a more highly skilled job.

In 1965, candidates accepted for the various "certificats d'études professionnelles" (Metallurgy) in the Paris region came from the following sources:

State education	51%
In-plant training	25%
Adult vocational training	9%
Government	4%
Miscellaneous	11%

The State education percentage will increase for "brevet de technicien" and "brevet de technicien supérieur" in view of the need to employ more substantial resources for these types of training.

On the other hand, the role of in-plant and inter-plant organisations may be expected to increase with the development of spécialisation courses to adapt holders of technical diplomas to work in their firm. In particular, they may play a larger part in preparation for the CAP. The Government accordingly agreed, in 2 circulars of 16th May 1961 and 13th April 1965, to make a financial contribution to the operating and investment expenses involved in establishing inter-plant organisations preparing adolescents of 14 to 17 for the CAP.

A few typical examples of private training schemes are considered below.

(i) "Régie nationale des Usines Renault" (RNUR)

Under the Directorate of Personnel and Social Relations there are two specialised training services:

The vocational school at Boulogne, which provides full-time courses The teaching staff is composed of State schoolteachers working in a private capacity, and full-time or part-time employees of the RNUR.

The school's annual intake, on the basis of an examination, is about 90 CEP level students, to be prepared in 3 years for various CAPs in metallurgy; 30 BEPC(1) level students, to be prepared in 4 years for the "baccalauréat technique" or the "brevet de technicien".

Students sit various CAP examinations at the end of the 2nd and 3rd years.

Courses cover 45 hours per week, with a strong bias towards practical subjects (specialised technology and practical work in the shops).

During the school year 1964-65 students of this vocational school obtained 243 CAPs and 19 BEIs (2).

The Central Training Service covers all RNUR establishments. It is mainly occupied in vocational training and advanced training for adult employees.

Courses are generally part-time and the teaching staff comes from the same sources as in the vocational school.

The Central Training Service operates at several levels:

- By providing classes for illiterates;
- By providing general courses leading to the "certificat d'études primaires (CEP);
- By providing full-time vocational training courses for training skilled workers. These courses are given in a training centre belonging to the RNUR and operating with FPA assistance (adult vocational training);
- By providing preparatory classes leading to a works diploma called the "certificat d'études techniques Renault" (CETR), of "brevet de technicien" level. The diploma is normally obtained after five

(1) BEPC: Brevet d'enseignement primaire du premier cycle.
(2) BEI: Brevet d'enseignement industriel.

years of evening classes and is organised on the basis of certificates;

- By providing full-time training courses for draughtsmen, lasting 6 to 8 months;
- By exercises and practical work for staff registered at CNAM (preparation for the first certificate). Thereafter these courses are continued directly in the CNAM. Students are granted time off to attend, and also receive financial assistance.

The budget of the RNUR training service is Fr. 3,000,000. Out of a staff of 32,000 there are always 1,500 following courses.

The FPA trains 200 persons per annum; 20 of these obtain the "certificat d'études techniques Renault" (CETR) each year and 120 are enrolled at the "Conservatoire national des Arts et Métiers.

(ii) IBM

The General Education Service of IBM is attached to the Secretariat. The Service maintains a unit in each IBM establishment.

There are two kinds of training:

- Full-time complete training

This is provided in the Corbeil-Essonnes plant. Students must be of 4th year "collège" level (classe de 3e) and must sit a competitive entrance examination. They are trained in 2 years for the "certificat d'aptitude professionnelle" (CAP) in electronics. The best may continue their studies for a further two years and sit the "brevet de technicien supérieur" (Electronics).

- Full-time or part-time advanced training

Courses are given in all IBM establishments. They include:

- Specialisation courses for new recruits holding a technical diploma. The most usual case is that of technician-inspectors, who are graduates of the former "écoles nationales professionnelles"(ENP) (technical State lycées) or holders of the technical "baccalauréat" and who receive 6 months' full-time training in electronics;

- Retraining courses of varying duration for all employees. Ten to fifteen per cent of inspectors are constantly being retrained;
- Vocational training courses to enable employees to reach a higher grade;
- Part-time general courses (mathematics, physics, modern languages) given in programmed form by correspondence or orally.

A system of "Reimbursement of expenses incurred for study purposes" exists under which any member of the Company may obtain 75 per cent of his expenses if he passes his examination. The offer is good for any course the person may wish to chose, so long as it has a good reputation. In some cases (Centre for Business Management, International Institute of Commerce) the company's contribution may exeed 75 per cent.

For 1965, educational expenses in the strict sense of the term (organization of classes, staff expenditure training services, cost of outside classes) reached 4.5 per cent of total wage bill. If to this is added a sum corresponding to the number of hours devoted to education, the total is nearly 10 per cent of the total wage bill.

This expenditure is split up as follows: 5/6ths for technical training of which 2/6ths for training inspectors responsible for maintenance of material held by the client; 1/6th for general training in the trade, which represents a particularly high proportion.

The total number of registrations for courses is 15,000 per year, even though the staff numbers only 11,000, some having registered for several courses.

(iii) "Centres inter-entreprises de formation" (CIF) (Inter-plant Training Centres)

The aim of these Centres is to train technicians capable of directing production, maintenance or methods services. It is a non-profit association recognised by the Ministry of Education, thus entitling it to obtain a grant of 30 per cent of its operating costs, the remainder being provided by contributions from the 40 or so participating firms.

Since 1958 these Centres train "Production Engineers" (ingénieurs de production) but this title is not recognised by the Government. They are in fact very high-level technicians.

Candidates presented by their firm must have 5 years' industrial experience, including 2 years as foreman, technician or draughtsman.

Admission is conditional on examination of the candidate's record, tests of his knowledge, psychotechnical tests and interviews. The level required is equivalent to that of the "baccalauréat technique".

Courses cover 2 years full-time; the first period of 8 months is to extend general education, the second 7 months is devoted to technical and scientific education, and the third period (6 months) concentrates on specific problems of industrial application. The last month gives a general synthesis of the course.

During each period, study at the Centre alternates with practical work in plants. Students holding a "diplôme d'études supérieures techniques" (DEST) are admitted directly to the second period of study.

The Boulogne Centre takes 48 students each year; the Arras Centre provisionally 25, but this figure is to be raised to 48. Another Centre is to be opened at Lyon with 48 places. Students are divided into working groups of 24 or 12, according to the subject. The teaching staff come from other engineering schools or are themselves works engineers. From 1961 to 1964 the CIF trained 139 "production engineers".

The CIF also organised general training courses which may be regarded as preparatory to higher vocational training. Advanced management training covers series of courses of varying length spread over 16 months; the courses themselves represent a total of 4 months.

In addition, seminars for young engineers and managers facilitate their adjustment to the life of the firm.

(iv) Paris Chamber of Commerce and Industry

The Paris Chamber of Commerce, like all local Chambers of Commerce, has an important influence on vocational and technical training. About 70 per cent of its resources are devoted to its educational establishments. It operates at all levels, from the "certificat d'aptitudes professionnelles" (CAP) to advanced training for top management.

Syllabuses are either those fixed by the State (CAP) or special ones adapted to local requirements.

Some of the Paris Chamber of Commerce shools are fee-paying, but award fellowships and loans.

The teaching staff may be part-time or full-time and is drawn from 3 sources:

- Teachers seconded from State schools;
- Teachers depending entirely on the Paris Chamber of Commerce;
- Persons employed in industry.

Industry accounts for 56 per cent and education 44 per cent of the total teaching staff.

The Paris Chamber of Commerce schools have a total roll of 7,000 to 8,000 students. Its aim is not to compete with State education, but to create original prototypes which may be regarded as teaching laboratories.

Technicians are trained in the following schools:

"Centre de préparation supérieure au secrétariat" (CPSS)

Courses are intended for girls holding at least the baccalauréat, who receive one year's training as secretary and tertiary sector technician. Part-time advanced training is given in evening classes.

"Ecole commerciale de jeunes filles" (ECJF)

The level required in order to sit the competitive entrance examination is the completion of the first cycle. Students receive 2 year's training in secretarial work or accounting and can obtain State dilpomas (CAP, BEC) and the school diploma.

"Ecole commerciale de la Chambre de commerce et l'industrie de Paris" (ECCIP)

The level required for the competitive entrance examination is the completion of the first cycle. Courses last 3 years.

The ECCIP diploma bears the official visa of the Ministry of Education, and its holders obtain middle management posts in administration and commerce.

"Centre de diffusion des méthodes d'enseignement" (CEDIME)

This Centre provides advanced training for persons unable to attend specialised schools, but who nevertheless hold posts of considerable responsibility in small businesses.

Courses last 15 months and take place by correspondence.

"Ecole Bréguet"

The school has 2 sections, one training engineers and the other training technicians for the electrical engineering and electronics industries.

Candidates for higher technician courses must have reached a level equivalent to that of the "baccalauréat scientifique".

Courses last 3 years. The diploma awarded is the "brevet d'Etat de technicien supérieur" in electronics and electrical engineering.

"Ecole supérieure des industries du vêtement" (ESIV)

The School trains technicians for technical and administrative supervisory posts in the clothing industry.

Candidates must have reached baccalauréat level and have at least one year's industrial experience.

Courses cover one year full-time. The diploma obtained is a"diplôme d'ingénieur" (not recognised by the State) or a "diplôme de technicien ESIV"

VIII. TRAINING OF COMMERCIAL TECHNICIANS

Training of all grades of commercial technicians follows the same lines as training of industrial technicians.

The present tendency is to regroup a large number of specialised diplomas into more general trade diplomas.

(a) Training of junior technicians

There is no "diplôme d'agent technique" in the commercial sector. However, there is a "brevet de technicien" which is prepared in the "lycées techniques" and assimilated establishments. The various specialisations are established by Order of the Ministry of Education.

Students start the course at 15, on completing the observation

cycle, and continue for three years (classes de 2e, lère, terminale). They then sit a public examination for the "brevet de technicien" in certain special subjects, the most popular being secretarial work and accounting. Table 9 gives a summary weekly timetable for the "brevet de technicien" specialising in secretarial work. The detailed timetable is given in Annex VI.

Table 9

Weekly timetable for the "brevet de technicien" (secretarial)

Subject	5th year (2e)	6th year (lère)	7th year (terminale)
Literary subjects	9 hours	6 hours	11 hours
General vocational subjects . . .	4 "	7 "	7 "
Specific vocational subjects . . .	14 "	14 "	8 "
Other subjects	9 "	6 "	5 "
Total	36 hours	33 hours	31 hours

Source: Ministry of Education

(b) Training of higher technician

The "diplôme universitaire de technologie" (DUT) will be prepared in the "instituts universitaires de technologie" (IUT) (University Institutes of Technology). Candidates holding the "baccalauréat" or the "brevet de technicien" are eligible for admission. Courses will last 2 years full-time and lead to a public examination for the "diplôme de technicien supérieur", stating the specialisation.

The specialisations planned by the Ministry of Education are:

- Business administration (with three options: finance, commerce and law);
- Local Government;
- Information and documentation techniques.

The teaching staff will be drawn from higher education, technical education (teachers of higher technician sections), or from business circles.

IX. TRAINING OF AGRICULTURAL TECHNICIANS

Agricultural technical education is the responsibility of the Ministry of Agriculture which has a Directorate for Education and Vocational and Social Affairs. There is, however, close liaison between the Ministries of Agriculture and of Education. There are numerous possibilities of switching from one type of education to the other.

Agricultural technical education consists of three cycles and is available to boys and girls aged 13 or 14 who have reached the end of the 2nd year (classe de 5e):

Cycle I lasts three years and leads to the "brevet d'apprentissage agricole" (Certificate of Agricultural Apprenticeship), which is equivalent to the CAP. Holders of this diploma can then go on to prepare the specialised "brevet professionnel".

Cycle II also lasts three years and leads to the "brevet d'enseignement agricole" (Certificate of Agricultural Education). This cycle may be extended by one year for students wishing to sit the specialised "brevet d'agent technique agricole".

Cycle III lasts five years and leads to the "brevet de technicien agricole", which represents an overall educational level equivalent to the baccalauréat (though with a different structure); it is the equivalent of the "brevet de technicien" in the lycées techniques". Cycle III may be extended either by a further two years' specialised training in higher technician classes, or by preparation for higher agricultural education.

The "lycées agricoles" provide Cycle II and Cycle III, while the "collèges agricoles" provide Cycle I and Cycle II.

There are various possibilities of switching from one to the other after completing their 2nd year of general education (classe de 5e), students may go into the 3rd year (4e) of Cycles I, II or III, and after their 4th year (3e) go to the 5th year in Cycle III (2e).

At the beginning of the school year 1965-66, there were 48 "lycées agricoles" and 30 "collèges agricoles" for boys. Student breakdown was as follows:

Cycle I	1,171 students
Cycle II	4,190 students
Cycle III	6,008 students

At the same date there were one "lycée agricole" and 46 "collèges agricoles" for girls. Student breakdown was as follows:

Cycle I	399 students
Cycle II	2,844 students
Cycle III	276 students

In addition, part-time courses for adults are organised in various special subjects.

X. TRAINING OF HOTEL STAFF

Courses for hotel workers in France are organized in the same way as industrial, technical or economic courses.

The old "écoles hôtelières" have been replaced by the "lycées techniques hôteliers", of which there are 9: Bourges, Clermont-Ferrand, Grenoble, Nice, Paris, Poligny, Strasbourg, Thonon, Toulouse.
These establishments prepare boys and girls for technical and administrative careers in the hotel industry.

Courses normally last three years and cover the 5th, 6th and 7th years (classes de 2e TH, 1ère TH, TH). They may be reduced to two years for students admitted directly to the "classe de 1ère TH" (students admitted to the terminal class of classical or modern lycées, or holders of the "brevet d'enseignement hôtelier").

Only candidates who have completed the first cycle of education may be admitted to the "classe de 2e TH". They may be admitted after an examination of their record by the Council of Teachers of the "lycée technique hôtelier". If admission is refused, they can sit a competitive entrance examination.

Instruction is general, vocational and practical. The last-named consists of pratical work inside and outside the lycée during the school year and a compulsory vocational training period organised and controlled by the school authorities during July and August.

On completion of their final year students sit the "brevet de technicien de l'hôtellerie" and may also sit various CAP examinations.

Part Three

FUNCTIONS OF TECHNICIANS

I. TECHNICIANS AND THEIR JOBS

There is a difference between the State's conception of the technician, based on a diploma, and the conception current in industry, based on the job performed. At the present stage the diploma seldom coincides with the job.

The "Conseil national du Patronat français" (CNPF) (French Employers' Council) proposed the following definition of the technician:

> "The Technician, or assimilated person, is a wage-earner performing a function, trade or job placing him technically between the operative (manufacturing, maintenance or clerical) on the one hand and the engineer or assimilated person on the other hand, without regard to his place on the promotion ladder (chargehand, shop foreman, site foreman, manufacturing supervisor)."

Qualified personnel in posts of command would therefore not be regarded as technicians, and the term would apply only to personnel in "functional" posts e.g. Projects, Design, Planning, Development, Testing, Control, Accounting, Management secretariat, etc.

The "Union des industries métallurgiques et minières" (UIMM), in a survey carried out among its members in 1964, showed that only 32.72 per cent of metal technicians (including formemen) had received adequate training.

Table 10

Breakdown of UIMM technical middle management
in relation to training levels

Training level	1954		1964	
	Establish-ment	%	Establish-ment	%
Nil	56,089	37.77	106,673	38.79
Certificat d'aptitude professionnelle	43,317	29.17	78,347	28.59
Brevet d'enseignement industriel	26,819	18.06	46,915	17.06
Brevet professionnel	5,829	3.92	15,372	5.59
Ecoles nationales professionnelles	14,219	9.57	16,830	6.02
Higher technical training . . .	2,227	1.51	10,863	3.95
Total	148,500	100 %	275,000	100 %

II. CAREER AND STATUS OF TECHNICIANS

(a) Professional associations

There are two main professional associations:

- Fédération française des anciens élèves des enseignements techniques et professionnels, 6, rue Marengo, Paris ler;
- Société nationale des techniciens supérieurs et anciens élèves des ENP, 43, rue Decamps, Paris 16e, which desires to cover all higher technicians regardless of origin.

(b) Salaries

As there is no direct correlation between the definition of technicians established by the Decree of 6th January 1959 and the qualifications adopted by industry, a technician may occupy a management post and a skilled worker a technician's post. It is therefore impossible to establish any precise rule regarding technicians' salaries. Moreover, remuneration varies according to the size, specialisation or location of the undertaking.

It seems more realistic to give here a table based on a survey carried out by the "Société nationale des techniciens supérieurs et des anciens élèves des ENP", on salaries in 1964.

The survey relates to higher technicians, but it may be seen that their starting salary is much the same as that of "techniciens brevetés" and only after 5 to 10 years is there any substantial difference in salary between technicians and higher technicians. The breakdown is given by age, i.e. in relation to seniority.

Three figures are given:

- A minimum figure relating to the average salary for a category consisting of 25 per cent of the lowest paid technicians;
- A maximum figure relating to the average salary for a category consisting of 25 per cent of the highest paid technicians;
- An average figure relating to the average salary of the remaining 50 per cent.

Table 11

Monthly salaries of higher technicians in 1964

in Francs

Category	Age					
	20 ans	25 ans	30 ans	35 ans	40 ans	45 ans
Minimum	800	1,000	1,300	1,555	1,600	2,000
Average	900	1,250	1,750	2,400	2,300	3,000
Maximum	1,000	1,600	2,650	3,350	3,200	4,000

Source: "Le Technicien".

(c) Possibilities of promotion

Technicians' possibilities of promotion are practically unlimited owing to steady economic development, the present shortage of higher level staff, and the possibilities offered by adult vocational training schemes.

A survey carried out by the "Union des industries métallurgiques et minières" showed that, in 1964, 35 per cent graduates were assimilated to higher level staff, and 50 per cent of those above 30 years of age.

Of the total engineers and top level staff in the metal industries in the Paris district, 6.8 per cent were ENP graduates. They took second place, coming after the "ingénieurs des Arts et Métiers" (10 per cent) and before the "ingénieurs de l'Ecole centrale de Paris" (3.8 per cent). This shows that ENP training is greatly valued in industry.

(d) Summary of a survey on the functions of technicians in industry

In 1964, the OECD carried out a special enquiry into the functions of technicians in industry, covering three sectors:

- Electronic measuring instrument industry (three firms);
- Machine-tool industry, (16 firms);
- Electricity production and distribution (1 firm).

During this survey the investigators interrogated some 40 technicians in different branches and of different levels. A brief summary of the survey is given below. In addition, Annex VII contains a summary of data concerning 27 of the most representative technicians.

(i) Functions and position of technicians in the firm

Organisational posts

These posts are sometimes held by certificated engineers but mostly by technicians and higher technicians.

Operational posts

These are generally occuped by technicians and higher technicians.

Assistants' Posts

Technician training is necessary for these posts; many of their holders have the "brevet d'enseignement industriel" (BEI), but quite a lot have only a "Certificat d'aptitude professionnelle" (CAP) or are self-taught.

Foremen and chargehands

These posts should be occupied by men with technician training, but many of their occupants are former operatives promoted on their personal merits who have had only limited technical training (CAP) or even none at all. This lack of basic knowledge is nearly always offset by long experience in the workshops.

(ii) General comments

In certain cases and particularly in the electronics industry, engineers were found to be doing technician's work because of the manpower shortage in this category.

Firms expressed the desire to employ more technicians and higher technicians (up to 20 per cent more per annum in certain firms).

Firms are very pleased to take ENP graduates and BEI holders with industrial experience, although they find that a period of adjustment is necessary, as the technical education received is generally not sufficiently specialised.

The reasons given by technicians for taking the jobs they hold were: interest in the trade, immediate salary, future possibilities and security of employment. Most of them were anxious to improve their general education, but were finding some difficulty in doing so, either because of the need to give priority to acquiring technical knowledge, or because of working hours (overtime), or because they had no information regarding available courses. This desire was most evident in technicians under 30 years of age.

Part Four

GENERAL INFORMATION

- STATISTICS -

A study on technician training should take account of economic and social factors throwing light on requirements in this field. The statistics quoted below taken from the "Annuaire statistique de la France 1965", the Fifth Economic and Social Plan (1966-1970), and the Ministry of Education Statistics emphasise the importance of such data on economic and social problems.

I. FINANCIAL SITUATION

(a) National income

The gross national income increases with economic development. From 1949 to 1964 it rose by 495 per cent in current francs and by 206 per cent in constant francs, which is a clear indication of the depreciation of the currency, especially between 1949 and 1958 (Table 12).

Owing to the population increase between 1949 and 1964, income per head rose by 175 per cent.

(b) National production

Taking 1938 production as 100, we find that the volume of national income rose from 109 in 1949 to 234 in 1964 (Table 13).

Although industrial production rose during the same period from 122 to 304, agricultural production rose only from 93 to 130 from 1949

to 1961. We may deduce that an effort should be made to increase agricultural productivity, thereby necessitating more technicians in this field.

Variations in the durable household equipment rate show that the consumer is more and more attracted by the purchase of cars, television sets, washing machines, refrigerators, etc.

Industry should therefore concentrate on producing larger quantities of these goods, and an increasing number of technicians will be needed for laboratory research, planning, trials, distribution, etc.

(c) International trade (Tables 15 and 16)

The figures given in the publication describing the Fifth Plan show that, while French international trade has expanded in recent years, a further steady expansion may be expected in future.

In order to obtain a credit balance, exports will have to increase by 9.4 per cent per annum between 1965 and 1970, whereas the annual import growth rate should be limited to 8.8 per cent. Moreover, an increase in the industrial export rate will have to offset a reduction in the agricultural export rate.

(d) Productive investment (Tables 17 and 18)

From 1962 to 1965 productive investment rose by 14.7 per cent. The Fifth Plan forecasts an increase of 32.3 per cent from 1965 to 1970.

Table 15 shows that the investment drive, both in absolute figures and as a percentage, will relate mainly to industry and services, which is characteristic of a country at the stage where the percentage of technicians in the total active labour force is constantly increasing.

(e) Educational investment

The Ministry of Education budgets between 1962 and 1965, i.e. during the Fourth Plan, rose from Fr. 2,361,500,000 to Fr. 3,618,000,000, i.e. total of Fr. 12,175,946,000 for these four years, whereas the Plan estimate had been Fr. 12,000,000,000.

It should be noted that, while the total volume of the budget has risen, its share in the national budget has also increased. On 18th May 1965, adressing the National Assembly, the Prime Minister said that the education budget now accounted for 17 per cent of the overall State budget in 1965, as compared with 10 per cent in 1958.

It is interesting to note that the Commissariat du Plan estimated the necessary expenditure on education between 1965 and 1970 (Fifth Plan) at Fr. 32,500,000,000, whereas the Government estimate for the same period is Fr. 25,000,000,000.

Table 12

Gross national product between 1949 and 1964

Unit: Fr. '000 million

Year	GNP in current francs	GNP at 1959 prices
1949	87,16	171,92
1954	160,81	216,75
1955	172,16	227,88
1956	191,33	241,15
1957	213,00	253,28
1958	244,71	260,31
1959	267,777	267,377
1960	296,223	287,559
1961	319,689	300,656
1962	356,294	320,546
1963	395,577	336,818
1964	431,870	354,996

Source: "Annuaire Statistique de la France 1965".

Table 13

Principal economic indices - 1949 and 1954-64

1938 = 100

Year	Agricultural production	Industrial production	National income (in volume)
1949	93	122	109
1954	117	159	140
1955	118	172	148
1956	112	188	155
1957	115	204	164
1958	116	213	172
1959	121	220	176
1960	134	242	189
1961	130	254	198
1962		273	211
1963		279	222
1964		304	234

Source: "Annuaire statistique de la France 1965".

Table 14

Durable household equipment rate

(in percentages)

Year	1950	1960	1965	1970
Motor-cars	14	30	46.5	60
Television sets	-	14	41	73
Refrigerators	3	27	54	79
Washing machines	2.5	25	38.5	55

Source: Fifth Development. Plan

Table 15

Commodity imports (CIF)

	1962 Fr. '000,000		
	1962	1965	1972
Agriculture	4,390	4,550	5,100
Industry	32,400	47,170	73,900
Total	36,790	51,720	79,000

Source: Fifth Development Plan.

Table 16

Commodity exports (FOB)

	1962 Fr. '000,000		
	1962	1965	1972
Agriculture	2,410	4,040	5,650
Industry	34,740	43,000	67,400
Miscellaneous	280	320	650
Total	37,430	47,360	73,700

Source: Fifth Development Plan.

Table 17

Increase in investment between 1965 and 1970

Estimates of the Fifth Plan

Sectors	In volume 1962 Fr. '000,000	In %
Agriculture	785	18.7
Industry	9,047	30.3
Building and civil engineering	632	23.2
Services	5,976	38.2
Total	16,440	32.3

Source: Fifth Development Plan.

Table 18

Productive industrial investment by sectors

	1962 Fr. '000,000		
	1962	1965	1970
Agriculture	3,867	4,915	5,700
Industry	25,760	27,533	36,600
Building and civil engineering	1,960	2,718	3,350
Services	12,699	15,624	21,600
Total	44,286	50,810	67,250

Source: Fifth Development Plan.

Table 19

Education Budget

(Fr. '000)

	1962	1963	1964	1965	Total
Higher education	562,400	725,874	891,660	949,400	3,129,334
Higher technician	20,000	31,000	44,300	40,800	136,100
2nd Degree	1,072,050	1,267,500	1,507,000	1,809,500	5,656,050
1st Degree	407,950	490,300	507,819	436,200	1,842,269
Miscellaneous	31,100	53,100	44,893	48,200	177,293
Youth activities and sports . .	118,000	145,000	151,000	151,000	565,000
Research	150,000	153,000	184,000	182,900	669,900
Total	2,361,500	2,865,774	3,330,672	3,618,000	12,175,946

Source: Fifth Development Plan.

II. EDUCATIONAL STATISTICS

The reform now in progress makes it difficult to give an exact appraisal of educational data. Documents for previous years refer to a type of education which is destined to disappear, while forecasts relate to one which is not yet entirely in force. Moreover, statistics for "lycées techniques" do not always distinguish between students preparing for the "baccalauréat technique" or for the "brevet de technicien" (or the "baccalauréat de technicien").

Below are statistics of the number of students enrolled and final diplomas awarded, educational establishments and teaching staff.

(a) Number of students enrolled and final diplomas awarded

(i) Present situation

Tables 20 and 21 show breakdown of students between State and private educational establishments.

The total number of schoolchildren increased by 432,746 during 1963, due mainly to the higher number enrolled in State establishments.

Table 22 shows the steady increase in the number of students enrolled in "lycées techniques" during the academic years 1961-1962, 1962-1963, and 1963-1964. In view of the implementation of the 1959 reform, which is designed to give more prominence to technical education, the number of students in "lycées techniques" will certainly increase during the whole period of application of the Fifth Plan.

Table 23 gives the breakdown of students in "lycées techniques" by industrial, economic, social welfare and hotel trade sectors.

Industrial education is of greatest relative importance for boys; girls are naturally more attracted to economic and social welfare subjects.

Table 24 gives some results for certain technical diplomas. The "brevet professionnel" shows a very slight increase. The "brevets d'enseignement" have an increasing number of enrolments and passes, apart from the "brevet d'enseignement commercial" (BEC) which is destined to disappear, with a few exceptions.

The old "brevet de technicien" corresponds to the present BTS, (1) which explains the change-over that can be observed from 1962. Only in 1966 will students in "lycées techniques" be able to sit the new "brevet de technicien".

Table 25 gives a summary of the BTS awarded between 1956 and 1965.

(ii) Estimates

The estimated number of schoolchildren in the second, long cycle (State and private) is as follows for the period covered by the Fifth Plan: 692,000 in 1964-1965; 984,300 in 1972-1973; 1,083,500 in 1975-1976.

It is expected that in 1965-1966, 29 per cent or about 200,000 of the students in the second long cycle will be in "lycées techniques". This proportion will rise to 35 per cent by 1972-1973, i.e. about 360,000.

In 1972-1973 student breakdown in "Instituts universitaires de technologie" (IUT) should be as follows:

- 35,000 students in IUT attached to faculties of Law;
- 57,420 students in IUT attached to faculties of Arts;
- 75,290 students in IUT attached to faculties of Science.

The "Union des industries métallurgiques et minières" (UIMM) has studied technician training requirements in the metal industries. From 1962 to 1970, the metal industries will need 19,679 technical middle level professional staff per annum; breakdown by training level might be as follows:

- 4,465 holders of the "certificat d'aptitude professionnelle"
- 11,851 holders of the "brevet de technicien"
- 3,363 holders of the "brevet de technicien supérieur".

giving:

- 10,004 "Technical Assistants and Technicians";
- 3,646 Draughtsmen;
- 6,029 Foremen.

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(1) BTS: "Brevet de Technicien Supérieur.

(b) Educational establishments

(i) Present situation

There were 306 "lycées techniques", including annexes and "écoles de métiers", in the whole of France in 1963-1964. In addition, 189 classical and modern lycées had technical streams.

Five IUTs began to operate experimentally in 1965-1966.

(ii) Estimates

Taking account of the recovery of certain premises and of the orientation of some students to "lycées agricoles", the "Commissariat au Plan" estimated that establishments capable of accommodating 128,000 students would have to be set up for the full-length second cycle by 1972. For an average of 700 students per establishment, some 200 lycées would have to be created.

Of these new places, 20.2 per cent would have to be reserved for industrial technicians and 31.5 per cent for economic technicians, the remainder being for classical or modern students.

However, for material reasons, the Government has planned for only 73,000 new places. At a unit cost of Fr. 17,122, this represents an investment of Fr. 1,250,000,000.

In view of the possible recovery of unused premises, the "Commissariat du Plan" had estimated 68,000 new places in Arts and Law IUTs and 50,000 in Science IUTs by 1972, representing a total investment of Fr. 1,601,000,000.

For material reasons the Government can allocate only Fr. 1,255,000,000 to the construction of IUTs. The reduction will mainly affect Arts and Law IUTs.

(c) Teaching staff

(i) Present situation

Table 26 shows that the number of teachers in classical, modern and technical lycées is about 60,000.

Table 20

Number of schoolchildren

(School year 1962-63)

Type of education	State schools	Private schools	Total
Nursery schools	1,307,000	193,000	1,500,000
Elementary schools	4,978,000	928,000	5,886,000
"Collèges d'enseignement général" .	771,000	149,000	920,000
"Collèges d'enseignement technique"	244,000	144,000	388,000
"Lycées"	1,113,000	385,000	1,498,000
Total	8,413,000	1,799,000	10,192,000

Table 21

Number of schoolchildren

(School year 1963-64)

Type of education	State schools	Private schools	Total
Nursery schools	1,376,479	242,245	1,618,724
Elementary schools	4,996,404	873,647	5,870,051
"Collèges d'enseignement général" .	911,738	160,916	1,072,654
"Collèges d'enseignement technique"	280,244	150,902	431,146
"Lycées"	1,176,046	400,104	1,576,150
Total	8,740,911	1,827,814	10,568,725

Source: Ministry of Education.

Table 22

School population - Technical education

I. State establishments

	1961-62	1962-63	1963-64
5th year (2e)	44,622	59,045	68,349
6th year (1re)	29,454	35,423	48,873
7th year (terminale)	9,588	7,398	10,060
Higher technician	8,900	9,097	11,543
Hotel trade	1,390	1,391	1,378

II. Private establishments

	1961-62	1962-63	1963-64
Technical and miscellaneous			
Second Degree	12,321	9,586	5,223
"Lycée technique" level	47,613	47,479	36,608

Source: "Informations statistiques du ministère de l'Education nationale."

Table 23

School population

(State establishments by specialisation)

Type of education	1962-63			1963-64		
	Boys	Girls	Total	Boys	Girls	Total
Industrial	50,373	5,539	55,912	59,984	6,095	66,079
Economic	8,538	28,224	36,762	11,227	37,122	48,349
Social welfare . .	5	1,789	1,794	71	2,723	2,794
Hotel trade . . .	682	264	946	654	287	941
Terminal	11,215	2,274	13,689	7,673	2,824	10,497
Higher technician	6,600	2,497	9,097	8,422	3,121	10,543
Total	77,413	40,787	118,200	88,031	52,172	139,203

Source: "Informations statistiques du ministère de l'Education nationale".

Table 24

Technical examination results

		BP (1)	BEI (2)	BEC (3)	BSEC (4)	BES (5)	BEH (6)	BT (7)	BTS (8)
1961	Candidates	14,038	15,664	21,989	1,083	978	380	3,897	-
	Passes	5,641	10,938	16,307	813	761	285	2,074	-
1962	Candidates	11,893	14,441	11,926	1,767	534	410	185	4,725
	Passes	5,297	10,353	8,090	1,313	466	321	133	2,211
1963	Candidates	14,782	17,469	12,650	2,059	759	410	190	6,227
	Passes	6,588	11,612	9,317	1,459	615	308	109	3,361

Source: "Informations statistiques du ministère de l'Education nationale'.

(1) Brevet professionnel (2) Brevet d'enseignement industriel
(3) Brevet d'enseignement commercial
(4) Brevet supérieur d'enseignement commercial
(5) Brevet d'enseignement social (6) Brevet d'enseignement hôtelier
(7) Brevet de technicien (8) Brevet de technicien supérieur

Table 25

"Brevet de technicien supérieur" awarded from 1956 to 1965

Metallurgy	4,200	of which per annum at present	800
Electricity	5,600	" " " " " "	1,000
Chemistry	2,250	" " " " " "	500
Building or civil engineer.	1,060	" " " " " "	180
Plastics	250	" " " " " "	15
Optical/cinema	610	" " " " " "	120
Tertiary	5,200	" " " " " "	1,000
Total	19,170		3,615

Source: "Le Technicien", No. 41.

Table 26

Teaching staff
Classical, modern and technical lycées
Academic year 1963-64

Category	Science	Arts	Practical subjects	Special subjects(1)
"Agrégés"	2,464	5,753		34
"Certifiés"	8,236	11,135		3,649
"Chargés d'enseignement"	236	352		814
PTA and PT			3,553	
"Maîtres rectoraux" . .	5,315	6,584	1,416	2,451
Total	16,251	23,824	4,969	6,948

Source: "Informations statistiques du ministère de l'Education nationale", No. 74-75.

(1) Industrial drawing, specialised technology, commerce, fine arts.

Table 27

Total requirements of specialist teachers
for "lycées techniques", 1972-73

	No. of students	Teacher/student ratio	Teacher requirements
5th year (2e)	84,260	1/21.6	3,900
6th year (1re) . . .	183,834	1/26	4,420
7th year (terminale)	183,834	1/26	4,420

Source: Fifth Development Plan.

Table 28

Specialist teacher requirements by subjects
"lycées techniques", 1972-73

Subject	5th year (2e)	6th year (1re)	7th year (terminale)
Philosophy	-	-	510
Mathematics	780	1,020	1,190
History and geography	312	340	-
Physics and chemistry	780	680	850
French	468	510	340
Modern languages	468	510	340
Drawing	156	-	-
Mechanical engineering	-	-	-
Industrial drawing	936	1,360	1,190
Total	3,900	4,420	4,420

Source: Fifth Development Plan.

(ii) Estimates

The estimated number of students in technical lycées in 1972-73 is:

- 84,259 in the 5th year (2e);
- 91,917 in the 6th year (lère);
- 91,917 in the 7th year (terminale).

On the basis of a standard class of 30 students per teacher, and of students' and teachers' weekly timetables, a teacher/student ratio of 1/21.6 was estimated for the 5th year (2e), and 1/26 for the 6th and 7th years (lère, terminale).

On these data, Table 27 shows teacher requirements for the second-degree full-length second cycle in 1972-1973.

Table 28 shows teacher requirements by subjects for all "lycées techniques" during the academic year 1972-1973.

III. POPULATION AND MANPOWER STATISTICS

(a) Population

During the first half of the 20th century, France experienced a considerable decline in population. But at the same time the rising standard of living led to a larger school population, as many students continued their studies beyond the statutory school-leaving age.

The birth rate rose from 612,000 in 1938 to 840,000 in 1946, and this rate was maintained, as 870,000 births were recorded in 1963 and 875,000 in 1964. The higher birth rate was accompanied by a lower death rate, so that the population increased steadily from 40,125,000 in 1946 to 48,699,000 in 1965 (Table 29). The breakdown of the population by age is given in Table 30.

(b) Immigration

The increase is, however, also due to the return of French nationals residing in the overseas territories, particularly Algeria (710,000 French nationals repatriated from Algeria in 1962).

Table 31 shows the extent of immigration of foreign workers into France.

It is interesting to note that foreign immigrants usually have no vocational qualification and find jobs as unskilled labourers. The technician training drive in France should therefore be continued.

However, the Fifth Plan provides for a reduction in immigration between 1965 and 1970, in view of the lower demand for manpower, especially in building and civil engineering.

(c) Active population

The active population rose from 19,010,000 in 1962 to 19,535,000 in 1965 and should reach 20,165,000 in 1970. This increase is not proportional to the rise in total population, for three reasons:

- Higher birth rate;
- Lower death rate;
- Longer school attendance, owing to the raising of the school-leaving age and the higher standard of living.

In 1965, there were 100 active persons out of 251; in 1970 the proportion will be 100/254.

(d) Technician training requirements

The active population assessment by sectors shows an increase in services, mainly at the expense of agriculture, while industry makes slow progress. This is a general phenomenon of population switching, which occurs when productivity improves in agriculture and industry.

In addition, owing to the growing complexity of manufacturing processes, intellectual work will become more important than physical work, thus provoking an increase in the number of technicians. The Fifth Plan estimated the following increases:

Technicians, Technical Assistants	62%
Draughtsmen	60%
Engineers	31%
Research personnel	75%

The number of technicians who will have to be recruited is shown in Table 34; State education will not be able to supply all the specialists required, however as shown in Table 35. The necessary resources to cover this deficit would have to come from high-level vocational training, adult vocational training (FPA), and interplant training. It is hoped that in 1972 the "instituts universitaires de technologie" (IUT) will accommodate 120,000 students divided into 2 years; this would represent 25 per cent of higher education students.

Table 29

Annual population assessments for Metropolitan France

(1946 to 1965)

Unit: '000

Year	Population at 1st January	Year	Population at 1st January
1946	40,125	1956	43,627
1947	40,448	1957	44,059
1948	40,910	1958	44,563
1949	41,313	1959	45,015
1950	41,637	1960	45,465
1951	42,010	1961	45,904
1952	42,301	1962	46,422
1953	42,618	1963	47,573
1954	42,885	1964	48,134
1955	43,228	1965	48,699

Source: "Annuaire statistique de la France 1965".

Table 30

Total population

(Including net immigration)

Unit: '000

Age group	Numbers in '000			Numbers as a percentage			Indices 1962 = 100	
	1962	1965	1970	1962	1965	1970	$\frac{1965}{1962}$	$\frac{1970}{1962}$
0 - 4 years	4,078	4,141	4,277	8.7	8.5	8.3	101.5	104.9
5 - 14 years	8,240	8,255	8,353	17.5	16.9	16.3	100.5	101.4
15 - 19 years	3,327	4,140	4,169	7.1	8.5	8.1	124.4	125.3
20 - 59 years	23,305	28,853	25,205	49.6	48.6	49.2	120.4	108.2
60 - 64 years	2,506	2,634	2,658	5.3	5.4	5.2	105.1	106.1
65 and over	5,544	5,927	6,628	11.8	12.1	12.9	106.9	119.6
Total population	47,000	53,950	51,290	100	100	100	104.1	109.1

Source: Fifth Development Plan.

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Table 31

Balance of migratory movements

Year	Repatriated	Algerians	Foreigners	Total
1962	710,000	25,000	125,000	860,000
1963	80,000	45,000	125,000	250,000
1964	25,000	40,000	145,000	210,000

Source: "Informations statistiques du ministère de l'Education nationale".

Table 32

Breakdown of population

Unit: '000

	1954	1962	1965	1970
Active population	19,000	19,010	19,535	20,165
Non-active population	24,060	27,990	29,415	31,125
Total population	43,060	47,000	48,950	51,290
Number of persons for 100 active persons	227	247	251	254

Source: Fifth Development Plan.

Table 33

Assessment of active population employed in four sectors

Unit: '000

Sector	1954	1960	1962	1965	1970	Percentage annual growth			
						1962/1954	1970/1962	1965/1960	1970/1965
Agriculture	5,019	4,039	3,754	3,415	2,830	-3.6	-3.5	-3.3	-3.7
Industry	5,449	5,610	5,700	5,895	6,160	0.6	1.1	1.0	0.9
Building and civil engineering	1,285	1,470	1,552	1,765	1,850	2.4	2.2	3.7	0.9
Services	4,601	4,973	5,089	5,395	5,990	1.3	2.1	1.6	2.1
Other	2,520	2,716	2,795	3,020	3,310	1.3	2.1	2.1	1.9
Active population	18,874	18,808	18,890	19,490	20,140	0.0	0.8	0.7	0.7

Source: Fifth Development Plan.

Table 34

Technician recruitment requirements

	1962-70	1962-78
Higher technicians	500,000	1,110,000
Technicians	600,000	1,255,000

Source: Fifth Development Plan.

Table 35

Comparison between training requirements and possibilities

	Required 1962-78	Trained 1962-78	Deficit
Higher level staff and technicians	2,210,000	1,625,000	- 585,000
Technicians	1,255,000	1,170,000	- 85,000

Source: Fifth Development Plan.

Annex I

THE FRENCH EDUCATIONAL SYSTEM

A. The system prior to the reform

1. Nursery schools or infant departments

This instruction is not compulsory and is intended for children of 2 to 6. It is given in independent nursery schools and in the infant classes attached to primary schools.

2. First cycle, or primary education

This instruction is compulsory and is for children of 6 to 11. It is common to all without regard to pupils' subsequent orientation, and is given in boys', girls' or mixed primary schools.

Primary education covers 3 classes:

- Preparatory class (age 6-7);
- Primary class (age 7-9);
- Intermediate class (9-11).

The subjects taught are French, ethics and civics, reading and writing, arithmetic and the metric system, history and geography, object lessons and elementary science, elementary drawing, singing and hand-work, physical exercises.

3. Second degree education

This consists of:

- A first cycle of 4 years divided into two equal periods and offered by "collèges d'enseignement général", or by "collèges d'enseignement secondaire" or lycées;
- Two kinds of second-cycle instruction.

(a) First cycle (from 1st to 4th years inclusive (6e - 3e)

On the completion of their primary studies pupils are divided into two groups:

- Children whose school record is not good enough to admit them directly to the first class of the observation cycle or who have failed the entrance examination are sent to the "transitional" classes where they are given 2 years' practical instruction adapted to their level. They may then go either to the practical stream, which represents pre-vocational instruction, or may rejoin the observation cycle if they have shown themselves fit for it.
- The great majority of pupils go into the observation classes where they follow the same syllabus for 3 months. After this term the "Conseil d'orientation" invites parents to send their child either to the classical stream (Latin, one language) or to the modern stream (mathematics, one language).

At the end of the first two-year period pupils have a choice between four streams:

- The classical stream, which includes one option in Greek and another option in a second modern language; instruction is given by lycée teachers;

- Two modern streams (short and long) are taught respectively by lycée teachers and by masters in "collèges d'enseignement général"; these streams are characterised by more intensive French studies and, normally, by only one modern language.
- The practical stream, which devotes a lot of time to practical exercises and unspecialised pre-vocational instruction; classes are taught by teachers in "collèges d'enseignement général" and by specialist teachers.

The first cycle of second-degree education is given in classical, modern and technical lycées, "collèges d'enseignement général" (CEG), and "collèges d'enseignement secondaire" (CES). As more and more CES are established, they will accommodate all first-cycle pupils.

For children requiring special instruction, there are special classes and "Ecoles nationales de perfectionnement" for handicapped or maladjusted children and open-air schools.

(b) Second cycle

(i) Short second cycle (5th and 6th years - "classes de 2e et 1re").

This includes classes in the "collèges d'enseignement général" (CEG) leading in 2 years to the "brevet d'enseignement général" about the age of 17; - classes in the "collèges d'enseignement technique" (CET) leading in 2 years to the "certificat d'aptitudes professionnelles" (CAP) about the age of 17.

(ii) Full-length second cycle (5th, 6th and 7th years - "classes de 2e, 1re, terminale").

Instruction in this cycle is given in lycées. Children are guided towards one of 8 possible courses:

A Latin, Greek, one modern language;
A' Latin, Greek, mathematics, one modern language;
B Latin, two modern languages;
C Latin, mathematics, one modern language;
M Science, two modern languages;
M' Natural science, one modern language;

T Science, industrial technology, one modern language;
T' Economics, two modern languages.

At the end of the 6th year, if their school record is satisfactory, pupils are admitted to the 7th year terminal classes, which offer 5 possibilities:

- Philosophy;
- Experimental science;
- Elementary mathematics;
- Economics and technology;
- Mathematics and technology.

At the end of the terminal classes pupils must sit the baccalauréat.

4. Higher education

The baccalauréat gives access to the university faculties, of which there are 5 types:

Arts and Human Science Faculties

After one year's introductory course (propédeutique) the student must take four certificates to qualify for a first degree (licence). He may then go on to a second degree (diplôme d'études supérieures) in his specialisation, and then the "agrégation" or in two years a doctorat, for which he must submit a thesis.

Faculties of Law and Economic Science

First degrees in Law and Economics take 4 years. Thereafter it is possible to obtain a specialised "diplôme d'études supérieures" in a further year or a Doctor's degree in 2 years, which required the submission of a thesis.

Faculty of Science

After one year's introductory course (propédeutique), the student goes on to obtain 5 (or 6) specialised certificates for a first degree.

Thereafter he can prepare a specialised "diplôme d'études supérieures", and then a Doctor's degree, which requires the submission of a thesis.

Faculty of Medicine

Courses last 5 or 6 years and lead to the degree of "docteur en Médecine".

Faculty of Pharmacy

Courses last 5 years and lead to the "Diplôme d'Etat de pharmacien" or the degree of "Docteur en Pharmacie", which requires the submission of a thesis.

B. The reform of 1965-1966

As from the school year 1965-1966, a new system will gradually be brought into application in the long second cycle and in higher education. There is a general tendency towards reducing timetables.

(a) Long second cycle

As from 1965-1966 three 5th-year streams (classe de 2e) will be established:

(i) Stream A (literary), with or without Latin (in the latter case, 3 modern languages); on completing stream A, there are three possibilities:
- 6th year A, (1re A), Literature with "Arts" option;
- 6th year B (1re B), Economic and social sciences;
- preparation for "Baccalauréat de Technicien Economique".

(ii) Stream C (scientific), with the possible study of Latin (Greek optional) or one modern language. On completing Stream C there are 2 possibilities:
- 6th year C (1re C), Mathematics and physical sciences;
- 6th year D (1re D), Physical and biological sciences.

(iii) Stream T (technical), consisting of 8 hours of literary subjects, 10 hours of scientific subjects, 6 hours of industrial drawing, technology and engineering, and 6 hours of practical work in the shops, totalling 30 hours instead of 36 as previously. It should be noted that for the workshop period no personal work in school or at home is required, which represents a considerable reduction.

This 5th year class is common to all students choosing to work either for the baccalauréat or for the "Brevet de Technicien".

On completing Stream T there are two possibilities:

- 6th year T (1re T), industrial technical instruction including 6 hours of literary subjects, 10 hours of scientific subjects and 12 hours of technology, including 4 hours in the workshop, i.e. 30 hours in all.
- Preparation for the "baccalauréat de technicien industriel". These certificates will be reviewed and mostly replaced by "Baccalauréats de technicien" corresponding to a broader, more comprehensive training. They will be retained only for certain specialised types of training.

In the 7th year (classe terminale) there will be the 5 streams A,B,C,D,T, and the preparatory classes for the "baccalauréat de technicien industriel ou économique".

Five types of course have been defined, leading to 5 baccalauréats:

- Literary and linguistic (baccalauréat A);
- Economic and social sciences (baccalauréat B);
- Mathematics and physics (baccalauréat C);
- Natural science and applied mathematics (baccalauréat D);
- Scientific course closely associated with industrial technical course (baccalauréat T).

Each of these baccalauréats, without imposing any rigid orientation, prepares future students more particularly for one or other type of higher education.

Students will sit the baccalauréat at the end of the 7th year (terminale); there will be 2 sessions - (June and September).

The written examination will consist of 4 or 5 papers and the oral of 5 or 6 vivas.

The average pass mark is 10/20. Candidates who obtain at least 8/20 will receive a leaving certificate (certificat de fin d'études secondaires), which does not, however, give access to higher education.

(b) Higher education

There has been no change as regards Law and Pharmacy; Medicine has been extended by a further year.

As regards Arts and Science - which account for 2/3 of university students - the first-year introductory course has been abolished and two diplomas have been created: the "diplôme universitaire d'études" and the Master's degree (maîtrise).

A first two-year cycle on the basis of years and not certificates, leads to a "diplôme universitaire d'études littéraires" (DUEL) or a "diplôme universitaire d'études scientifiques" (DUES), as the case may be.

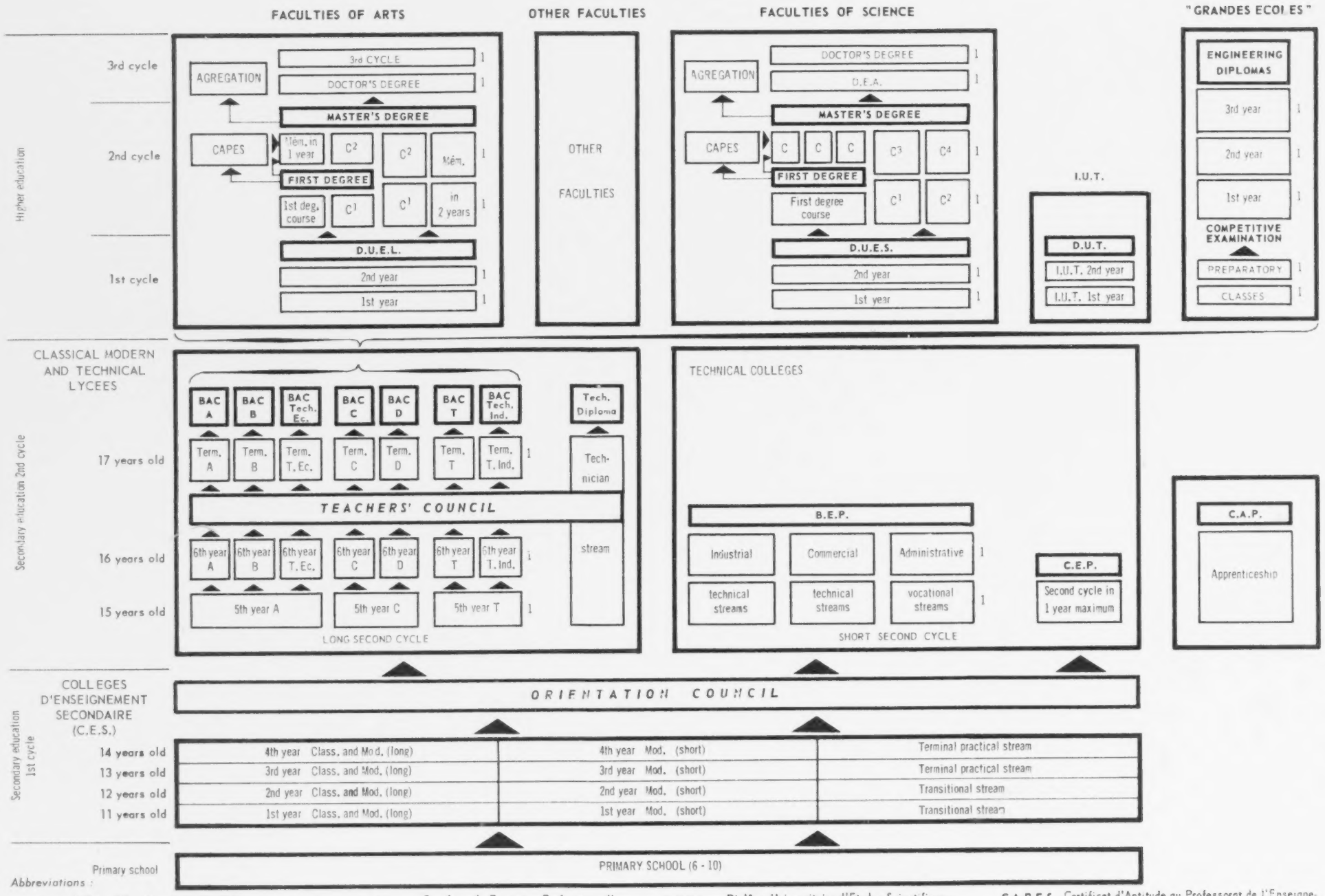
At the end of the first cycle, orientation panels guide students towards the first degree (licence d'enseignement), the Master's degree, or even the IUT.

The "licence d'enseignement" will be awarded after 2 years in the first cycle and one year on certificate work.

After the 2 years in the first cycle, a second period of 2 years, organised in 4 certificates, gives the Master's degree (maîtrise).

A third cycle, also of 2 years, leads to a Doctor's degree after submission of a research thesis.

C. ORGANIGRAMME OF THE EDUCATIONAL SYSTEM AFTER THE REFORM



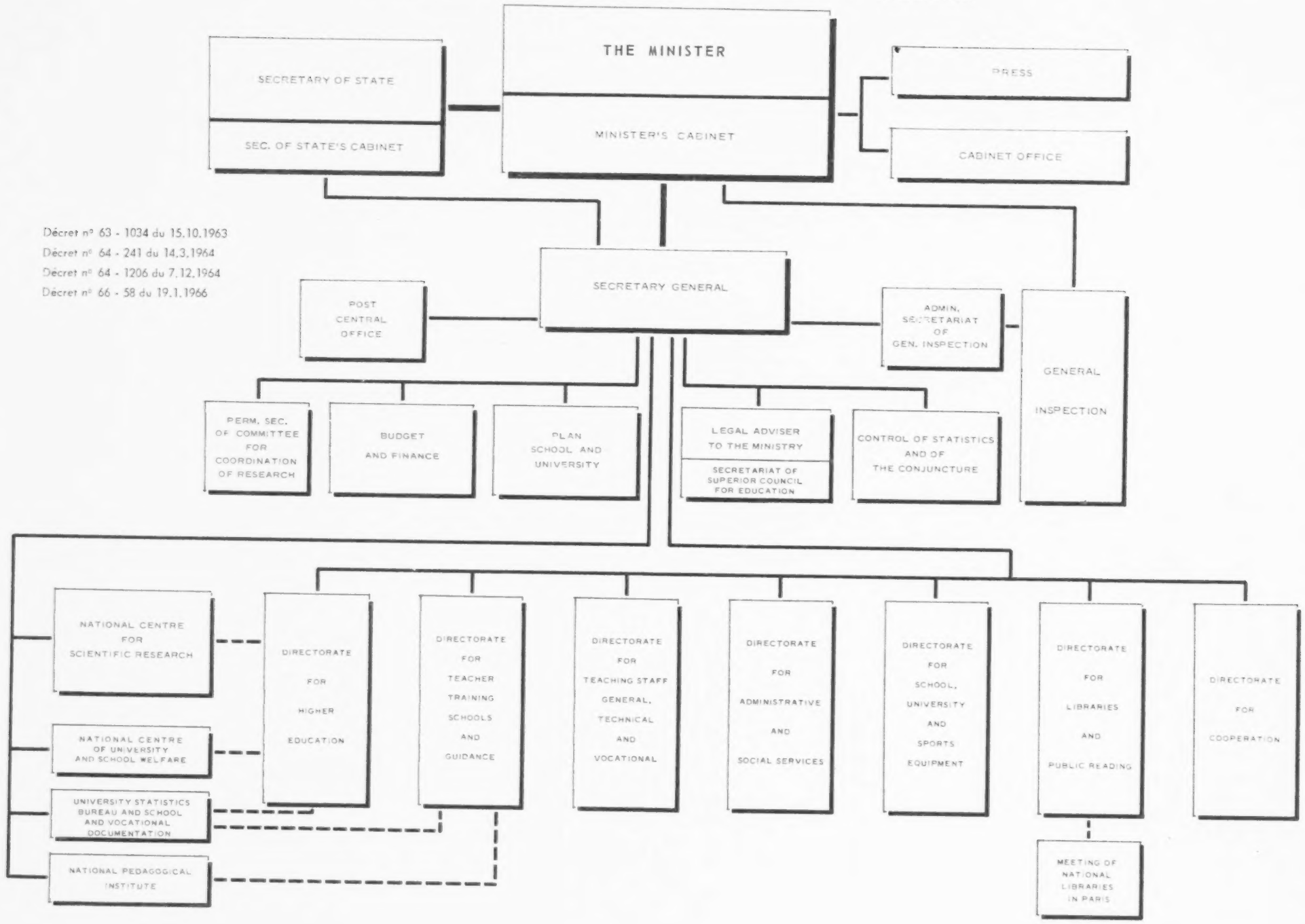
Abbreviations :

C.E.S.	Collège d'Enseignement secondaire	C.F.P.	Certificat de Formation Professionnelle	D.U.E.S.	Diplôme Universitaire d'Etudes Scientifiques
BAC. de Tech. Ec.	Baccalauréat de Technicien Economique	C.A.P.	Certificat d'Aptitude Professionnelle	D.U.E.L.	Diplôme Universitaire d'Etudes Littéraires
BAC. de Tech. Ind.	Baccalauréat de Technicien Industriel	I.U.T.	Institut Universitaire de Technologie	C.	Certificate
B.E.P.	Brevet d'Enseignement Professionnel	D.U.T.	Diplôme Universitaire de Technologie	D.E.A.	Diplôme d'Etudes Approfondies

C.A.P.E.S.	Certificat d'Aptitude au Professorat de l'Enseignement secondaire
Term.	Terminal
Mém.	Mémoire = short thesis

Annex II

THE ADMINISTRATIVE STRUCTURE OF THE MINISTRY OF EDUCATION


THE MINISTER
SECRETARY OF STATE
SEC. OF STATE'S CABINET
MINISTER'S CABINET
PRESS
CABINET OFFICE
SECRETARY GENERAL
POST CENTRAL OFFICE
ADMIN. SECRETARIAT OF GEN. INSPECTION
GENERAL INSPECTION
PERM. SEC. OF COMMITTEE FOR COORDINATION OF RESEARCH
BUDGET AND FINANCE
PLAN SCHOOL AND UNIVERSITY
LEGAL ADVISER TO THE MINISTRY
SECRETARIAT OF SUPERIOR COUNCIL FOR EDUCATION
CONTROL OF STATISTICS AND OF THE CONJUNCTURE
NATIONAL CENTRE FOR SCIENTIFIC RESEARCH
NATIONAL CENTRE OF UNIVERSITY AND SCHOOL WELFARE
UNIVERSITY STATISTICS BUREAU AND SCHOOL AND VOCATIONAL DOCUMENTATION
NATIONAL PEDAGOGICAL INSTITUTE
DIRECTORATE FOR HIGHER EDUCATION
DIRECTORATE FOR TEACHER TRAINING SCHOOLS AND GUIDANCE
DIRECTORATE FOR TEACHING STAFF GENERAL, TECHNICAL AND VOCATIONAL
DIRECTORATE FOR ADMINISTRATIVE AND SOCIAL SERVICES
DIRECTORATE FOR SCHOOL, UNIVERSITY AND SPORTS EQUIPMENT
DIRECTORATE FOR LIBRARIES AND PUBLIC READING
DIRECTORATE FOR COOPERATION
MEETING OF NATIONAL LIBRARIES IN PARIS

Décret n° 63 - 1034 du 15.10.1963
Décret n° 64 - 241 du 14.3.1964
Décret n° 64 - 1206 du 7.12.1964
Décret n° 66 - 58 du 19.1.1966

Annex III

"BREVET DE TECHNICIEN"

Mechanical engineering

(Weekly timetable)

Subject	First year	Second year	Final or terminal year
General subjects			
Literary:			
French	4 h	3 h	3 h
History	1 h	-	-
Geography	1 h	-	-
Modern languages	3 h	2 h	2 h
Scientific:			
Mathematics	5 h	3 h	3 h
Physics	1 h 30	2 h	-
Chemistry	1 h	-	-
Practical work - physics	1 h 30	-	-
Practical work - electricity	1 h	-	-
Engineering	-	3 h	3 h
Electricity	-	-	3 h
Metallurgy	-	-	1 h
Fine arts	1 h	1 h	-
Total	20 h	14 h	15 h
Vocational education			
Industrial drawing	4 h	-	-
Building technology and technical drawing	1 h	8 h	6 h
Practical work and general manufacturing technology	11 h	14 h	15 h
Total	16 h	22 h	21 h
Physical training	4 h	4 h	4 h
Grand total	40 h	40 h	40 h

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Annex IV

RESULTS OF THE "BREVET PROFESSIONNEL"

Paris, 1965

Metallurgy

Occupations	Candidates enrolled	Candidates sitting	Passes	%
Machining mechanics	354	350	234	71
Lathe operators	215	200	138	69
Millers	195	180	149	83
Boilermakers	109	97	61	63
Draughtsmen	492	452	189	42
Total	1,365	1,279	771	61

Annex V

TECHNICAL TRAINING CENTRES

Adult vocational training

Overseers	Toulouse
Surveying operators, mapping assistants	Meaux
Building technicians (main structure)	Colmar
Building technicians (other)	Colmar
Building draughtsmen	Colmar
Research office assistants (footwear)	Romans
Designers (reinforces concrete)	Champs s/Marne
Draughtsmen (reinforced concrete)	Champs s/Marne
Designer draughtsmen (metal structures)	Champs s/Marne
Designer draughtsmen (locks, joinery and metal frames)	Champs s/Marne
Designer draughtsmen (mechanical engineering) . . .	Champs s/Marne
Physical chemistry technicians	Champs s/Marne
Electronic technical assistants	Champs s/Marne, Angers, Grenoble, Pont de Claix, Rouen
Electro-technical assistants	Champs s/Marne
Technicians (reinforced plastics)	Caen
Radio and television set repairers	Champs s/Marne Angers, Grenoble Pont de Claix
Management secretaries	Paris, Lyon

Annex VI

"BREVET DE TECHNICIEN"

Secretarial

(Weekly timetable)

Subject	First year	Second year	Final year
(a) General subjects			
French and civics	3 h	3 h	4 h
History	1 h	1 h	-
Geography	1 h	-	-
Modern language I	2 h	2 h	3 h
Modern language II	2 h	2 h	3 h
Mathematics	2 h	-	-
Philosophy, psychology	-	-	3 h
Total	11 h	8 h	13 h
(b) Vocational education			
Law	2 h	2 h	2 h
Economics	1 h	2 h	3 h
Commercial correspondence	1 h	2 h	-
Office organisation	-	1 h	-
Commercial, accounting	4 h	-	-
Shorthand	5 h	5 h	3 h
Typing	5 h	4 h	-
Commercial office	-	5 h	6 h
Total	18 h	21 h	14 h
Fine arts	1 h	1 h	1 h
Home economics	2 h	1 h	1 h
Physical training	4 h	2 h	2 h
Grand total	36 h	33 h	31 h

Annex VII

POSTS OCCUPIED BY THE TECHNICIANS INTERVIEWED

	Title	Immediate superior	Qualifications		Qualifications desired by the firm
			Diplomas Certificates	Other	
A	1. Laboratory technician (Research and design)	Engineer	CAP (Electrical engineering)	Correspondence course	Basic technical training and industrial experience
	2. Technician	Engineer	BTS (Electronics	CNAM maths. course	
	3. Technician (Testing, adjusting)	Head of Testing and Adjusting Department	CAP (Electronics) + BP(Electronics)	Correspondence course	
	4. Technician (Quality control)	Sales Department	Diplôme fin d'études second.		
B	1. Princ. techn. asst. House engineer	Engineer in charge of laboratory	Baccalauréat technique	CNAM 4 years	
	2. Technician (Pulse laboratory)	Engineer	BEI (Electronics)		
	3. Technician (Production control	Head of Production Control	BEI (Electronics)		
C	1. Engineer (laboratory maintenance)	Head of Research and Design Department	Brevet élémentaire	CNAM Electrical engineering	
	2. Technician (Laboratory)	Engineer (Research and Design)	Agent technique	CNAM maths and electronics courses	
	3. Princ. techn. asst. (Technic. assistance)	Engineer	BTS (Electronics)		
D	1. Technician (Setting up)	Engineer (Technical Manager	CAP (Electronic wiring)	Self-taught (Adult Vocational Training)	
E	1. Designer	Head of Drawing Office	Nil	Self-taught	Better knowledge, modern techniques
	2. Designer	Head of Drawing Office	BEI	Study of formulae	
	3. Designer	Head of Drawing Office	ENP	CNAM maths., physics, chemistry	
	4. Designer-draughtsman	Head of Drawing Office	Nil	BP courses	Better knowledge, modern techniques

Annex VII (cont.)

	Title	Immediate superior	Qualifications		Qualifications desired by the firm
			Diplomas Certificates	Other	
E	5. Methods technician	Head of Methods Office	BEI	In-plant course	
	6. Methods technician	Head of Methods Office	ENP	Time Study Office	
	7. Methods technician	Head of Methods Office	Higher technician		
	8. Planning technician		CAP	OST courses	
	9. Production technician		BEI	In-plant course	
	10. Assembly technician		Nil	Works apprentice	
F	1. Overseer		BEI	Course on works organisation	More advanced technical qualifications - BEI
	2. Instrument technician	Foreman	CEP + Brevet technique milit.	Correspondence course	
	3. Laboratory technician	Foreman	CAP fitter BEI fitter	EDF school	BEPC + 6 months practical
	4. Shift superintendant (hydro generation)	Foreman	CAP + BEI electrician	Correspondence course	ENP
	5. Technical assistant (Control)	Head of Control Department	BEI - CAP Brevet de techn.	6 months practical training in works	BEI in-plant practical training
	6. Draughtsman	Head of Drawing Office	BEI	Ecole des travaux publ.	Brevet de technicien

Firms A, B, C, D: Electronic measuring instrument industry. Firm E: Machine-tool industry. Firm F: Electricity production and distribution industry.

Abbreviations

CAP : Certificat d'aptitude professionnelle
BEI : Brevet d'enseignement industriel
EDF : Electricité de France (French Electricity Authority)
BP : Brevet professionnel
BEPC: Brevet élémentaire du premier cycle
ENP : Ecole nationale professionnelle
BTS : Brevet de technicien supérieur
CNAM: Conservatoire national des Arts et Métiers
OST : Organisation scientifique du travail (Business Engineering)

Source: "OECD Enquiry into the Functions of Technicians in Industry in France".

Annex VIII

LIST OF ORGANISATIONS CONSULTED

Ministry of Education

- Centre d'études et de recherches documentaires de l'enseignement technique (CERDET)
- Service central des statistiques et de la conjoncture
- Sous-direction de l'orientation scolaire et professionnelle
- Bureau universitaire de statistiques (BUS)
- Ecoïe normale supérieure de l'enseignement technique (ENSET)

Ministry of Agriculture

- Direction générale de l'enseignement et des affaires professionnelles et sociales

Commissariat du Plan

Institut national de la statistique et des études économiques (INSEE)

Association nationale pour la formation professionnelle des adultes (AFPA)

Conservatoire national des Arts et Métiers (CNAM)

Syndicat national de l'enseignement technique

Association nationale des techniciens supérieurs et des anciens élèves des ENP

Fédération des industries mécaniques et tranformatrices des métaux (FIMTM)

Union des industries métallurgiques et minières (UIMM)

Régie nationale des usines Renault (RNUR)

IBM

Centre interentreprises de formation

Ecole supérieure de commerce de Paris

Annex IX

PRINCIPAL DOCUMENTS CONSULTED

- "Report on the education and training of engineers of non-university level and technicians in France" (OECD)
- "Report on the enquiry into the functions of technicians in industry in France" (OECD - DAS/ST/64.40)
- "Le premier cycle" (administrative documentation pamphlets)
- "Informations statistiques du ministère de l'Education nationale", (Nos. 60/61 - 74/75)
- "L'Education nationale", No. 20
- Programme of courses, examinations and competitive examinations of the Ministry of Education
- "Journal Officiel"
- SNET documentation
- "Annuaire statistique de la France 1965"
- 4th Economic and Social Development Plan
- 5th Economic and Social Development Plan
- Memoranda and documentary studies by "Documentation Française" :
  - Educational organisation in France
  - Educational planning in France
  - Vocational guidance in France
  - Agricultural education in France
- Student records, Conservatoire National des Arts et Métiers
- Statistical balance and annex (1964 financial year) of ANIFRMO
- "Avenirs", No. 113,114
- "Le Technicien", Nos. 30/35/38/41 and 42
- "Les agents techniques, techniciens, dessinateurs et agents de maîtrise des industries des métaux" (UIMM)
- Motions of the General Assembly of the CNPF held on 18.1.66
- Documentation of the Ministry of Agriculture
- " " " " Education
- " " Régie Nationale des Usines Renault (RNUR)
- " " Centre Inter-Entreprises de Formation
- " " Paris Chamber of Commerce and Industry.
- Formation du personnel scientifique et technique à la Compagnie IBM France, de J.M. Delaux.

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